UNIVERSITY OF CAPE COAST

EFFECT OF EXCHANGE RATE VOLATILITY ON SUSTAINABILITY INDICATORS OF OIL-MARKETING COMPANIES IN GHANA: THE CASE OF GHANA OIL COMPANY AND TOTAL PETROLEUM

GODWIN GARIBA

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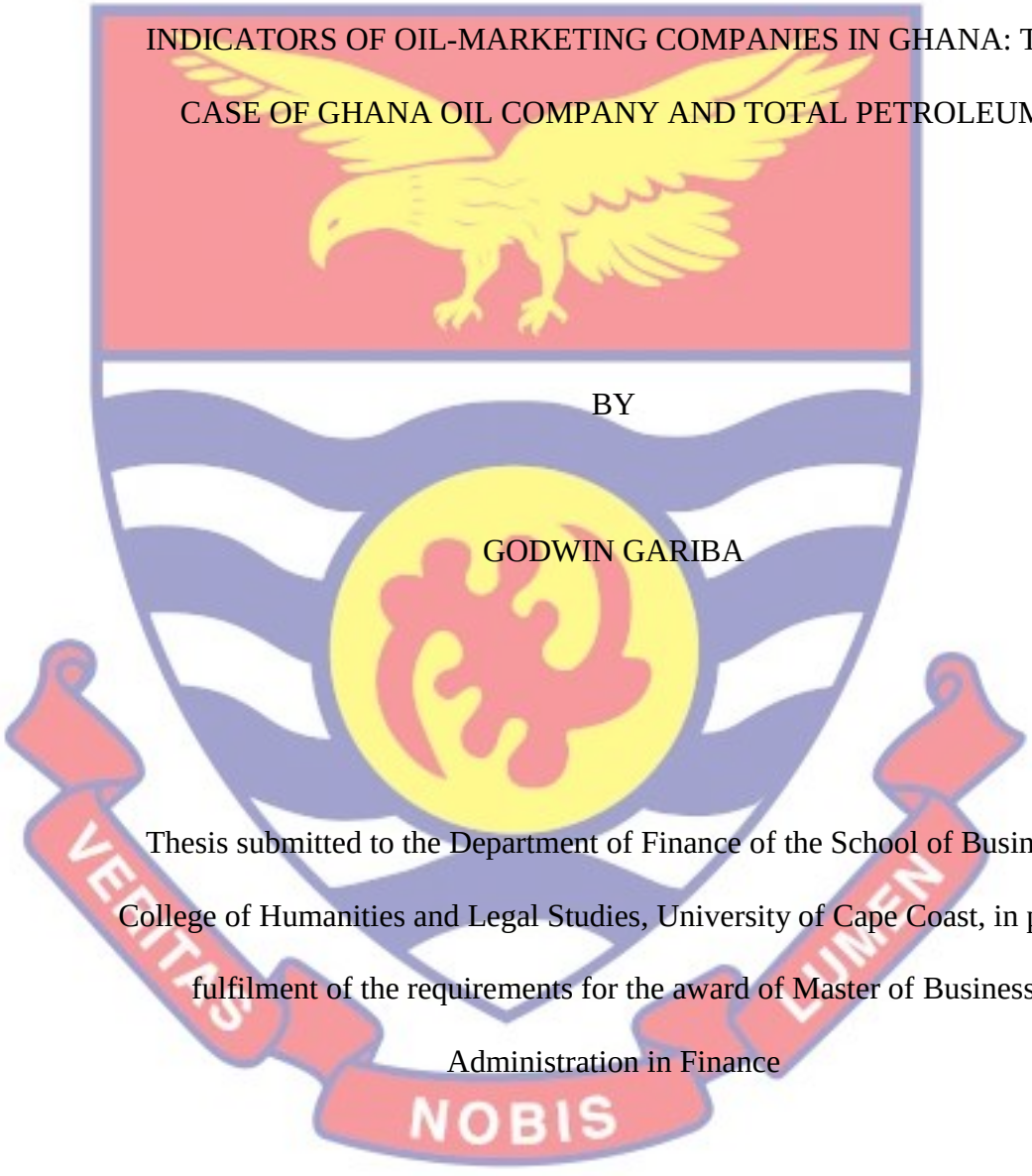

BY

GODWIN GARIBA

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AUGUST 2022

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature …… Date ……

Name: Godwin Gariba

Supervisor's Declaration

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature…… Date ……

Name: Mr. Carl Hope Korpoe

ABSTRACT

Exchange rate volatility affects both macroeconomic and microeconomic variables, yet little is known about the effect of exchange rate volatility on the sustainability indicators of Oil Marketing Companies (OMCs) in Ghana. Using data from two OMCs (Ghana Oil Company Limited and Total Petroleum), this study analyses the differential effect of exchange rate volatility on the liquidity, growth level, firm size and the financial leverage of Ghana Oil Company and Total Petroleum. The study uses fixed and random effect estimation methods to achieve the above stated objectives. The study found out that exchange rate volatility has a significant negative effect on the liquidity of the two OMCs in Ghana. Exchange rate volatility was also found out to have an inverse effect on the growth of OMCs in Ghana. In analogous estimation, exchange rate volatility had a similar cascading effect on OMCs firm size and growth level in Ghana. In terms of policy recommendations, the Bank of Ghana should adopt a fixed exchange rate regime in order to help protect domestic Oil Marketing Companies in Ghana. Managers of Oil Marketing Companies should pay much attention and keep themselves abreast with happenings on the forex market as well as hedge the prices of the product in the international market.

KEY WORDS

Exchange Rate Volatility

Financial Leverage

Ghana Oil Company

Liquidity

Oil Marketing Companies

Total Petroleum

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DEDICATION

To my wife: Priscilla Lamptey

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LIST OF ACRONYMS

BoG	Bank of Ghana
BWA	Breton Wood Agreement
CAPM	Capital Asset Pricing Model
FER	Fixed Exchange Rate
GNPC	Ghana National Petroleum Commission
GOIL	Ghana Oil Company Limited
IMF	International Monetary Fund
LOOP	Law of One Price
NPA	National Petroleum Authority
OLS	Ordinary Least Square
OMCs	Oil Marketing Companies
PC	Petroleum Commission
PPP	Purchasing Power Parity
TP	Total Petroleum
USD	United States Dollar

CHAPTER ONE

INTRODUCTION

Oil marketing companies are core to the survival of the energy sector in any economy especially in Ghana where their roles are to the survival of many households. However, oil marketing companies face daunting challenge of an unstable exchange rate which tend to affect the general operations of oil marketing firms in Ghana. The issue of exchange rate instability among Ghanaian oil marketing players remain a great concern to oil experts, industry players and researchers alike. The unstable exchange rate has the possibility of scaring potential investors in losing their huge financial resources put into the marketing of oil products. This has condensed the general confidence level for a potential future investment in the oil marketing activities with its consequences on oil and marketing companies' liquidity level, growth, size and financial leverage levels. However many oil marketing firms in Ghana are oblivious of whether unstable exchange rate affect oil marketing firms in Ghana and the magnitude of such connection on the various indicators (liquidity, growth, size and financial leverage) of such oil marketing firms in Ghana especially in the case of the two dominant oil marketing firms (Ghana Oil Company and Total Petroleum).

The purpose of this paper is to assess the extent and magnitude to which exchange rate volatility affect oil marketing companies in Ghana. This study will review literature on exchange rate volatility and operational indicators of oil marketing companies.

Background to the Study

The role of oil marketing companies in the world economy cannot be underestimated because their direct and indirect involvement in oil activities that forms the basis for the survival of many households across the globe (Jahangir & Dural, 2018). Through the engagement of oil marketing companies, there have been massive improvement in infrastructure which eventually increase productivity, boost the other sectors of the economy, increase foreign investment and ensure exclusive growth targeted at helping to alleviate poverty and reduce income inequality (Akinlo, 2012). On the contrary, there are multiplicity of factors that affect the oil industry in most economies including crude oil availability, oil price fluctuation, high transportation cost, as well as exposure to high uncertainties associated with currencies exchanges. One of such critical determinants is the growing and volatile exchange rate which confront many oil marketing operators across the world. Forbes (2002) admits the popular view that opinions about the level of exchange rate volatility transcend beyond the micro-level to the macroeconomic level hence affecting both individuals and the macroeconomic variables. Frieden (2016) further explained that upward and downward movement in the exchange rates has a possible effect on traded shares of economies, multinational companies and the production expenditure especially involving both imports and exports of goods and services.

Ghana operated under a system of fixed currency rates from 1970 to 1982. The American Dollar and the British Pound Sterling are the most popular and regularly used exchange rates for the Ghana cedi. An Economic Recovery Programme (ERP) was started in the nation's effort to promote

exports through the rationalization of the currency rate and "getting the price right." The program's goal was to shift resources to economically productive sectors. The government devalued its currency repeatedly in an effort to increase economic activity. A floating exchange rate system was implemented by 1986, and in September of the same year, an auction market strategy was also implemented. This was done to speed up exchange rate adjustments, which were left partially to market forces (demand and supply) in determining cedi-dollar rates, to further trade liberalization.

Figure 1: Trend of Exchange rates between the Ghana Cedi and the US Dollar

The data indicates that the cedi has not been doing well relative to the dollar. Between 1960 and 1994, the cedi's performance was very consistent. The cedi thereafter began to depreciate significantly versus the dollar. When the cedi was redenominated in 2007, the exchange rate was 1 to 1. As the cedi started to weaken against the dollar and the exchange rate rose to $1=3.9 in 2016, this was not sustainable.

According to Nunow (2016), exchange rate volatility has some effect on the level of capital flight and exchange speculations in any economy. Due to the openness of countries, exchange rate volatility affects many entities including oil-marketing companies. In the Ghanaian context, many oil-

marketing companies have emerged due to the profitable nature of the oil trading business in the local economy. Most of these companies are into the marketing of oil products since Ghana relies on other countries which manufacture and transport oil from their production source for final consumption (Akaba, 2016). Major oil-marketing companies in Ghana including Ghana Oil Company, Total Petroleum Company and other similar competitors ought to strategise to meet the heavy burden of the volatile exchange rate. Consequently, exchange rates play a substantial role in directing the economy and are a determinant of domestic pricing, cost of operation, revenue level, and profitability levels that define the investment decision of OMCs in Ghana.

Research findings highlight that there has been limited study on the effect of the volatility of exchange rate on oil marketing companies in developing economies compared to developed economies due to the unavailability of relevant reliable data (Agu, 2002). Juhro and Phan (2018) opine that fluctuations in exchange rate among ASEAN countries account for unpredictable profit levels of traders, risk and indecisions in costs of goods, upsurge in transaction cost and increase in the general price levels. Eunice (2019) also delved into the relationship between exchange rate volatility and macroeconomic indicators from different countries culminating in dissimilar results. Muriithi (2018) came up with an inconclusive finding between foreign exchange rate and market performance of firms in Kenya.

It is therefore pertinent to assess how the exchange rate continues to exhibit a volatile nature and how it affects oil marketing companies in the Ghanaian economy. This is premised on the fact that there are policies

implemented to control and manage the exchange rate in Ghana though its effect on oil marketing companies is only generally gleaned from public discourse without any empirical content.

Statement of the Problem

Oil prices are accompanied by a high level of uncertainty due to considerable external influence on them. One of such external forces that exerts considerable force thus exchange rate has unintended effect on major macroeconomic indicators rendering them susceptible to high risks. Domestic investors are frightened to commit more funds in the operations of OMCs in Ghana. The rate of volatility in exchange rate increases uncertainty in trade and influence the volume of international trade of organization (Asteriou, Masatci & Pılbeam, 2016). In Ghana, the rapid depreciation of the Ghanaian cedi over the years has called for major concern in the oil industry, since oil marketing companies purchase their stock with foreign currency (USD) and sell in local currency (Ghana Cedi). Moreover, high volatility in the exchange rate requires OMCs to change more Ghana Cedi for a few US dollars in order to enhance their various operational activities. This has consequently resulted in abysmal performance among Ghanaian OMCs and resulted in unfavourable positioning of domestic OMCs compared to other foreign countries.

Scholarly works conducted on exchange rate volatility and the economic performance of developing countries have neglected its impact on the operations of oil marketing companies in Ghana. Studies (Kaustiime, 2018; Raddatz, 2007) concentrated on how exchange rate volatility spillovers and external shocks affect commodity price and output variance volatility in Ghana and Sub-Saharan African countries respectively. In other circles, Aloui,

Ben Aissa, and Nguyen (2013) and Chen, Choudhry, and Wu (2013) identified a close relationship between crude oil prices and dollar exchange rates which depends on the conditional volatility. However, there are gaps in understanding as to whether and the extent to which exchange rate volatility can affect oil-marketing companies in the Ghanaian economy. Therefore, this study seeks to fill the above knowledge gaps which is necessary for industry and also needs scientific inquiry.

Purpose of the Study

The main objective of this study is to assess the effect of exchange rate volatility on sustainability indicators of two selected oil-marketing companies in Ghana, namely Ghana Oil Company (GOIL) and Total petroleum.

Research Objectives

- Examine the effect of exchange rate volatility on the liquidity of Total petroleum and Ghana Oil Company.
- Examine the effect of exchange rate volatility on the growth of Total petroleum and Ghana Oil Company.
- Investigate the effect of exchange rate volatility on the size of Total petroleum and Ghana Oil Company.
- Examine the effect of exchange rate volatility on the financial leverage of Total Petroleum and Ghana Oil Company

Research Hypotheses

According to Forbes (2002), higher inflation, higher exchange rate volatility, increase in machinery cost affect a firm's performance and ability to grow. In the same vein, the researcher formulated four different hypotheses based on the above-stated objectives.

H_0: Exchange rate volatility has no significant effect on the liquidity of Oil marketing companies in Ghana.

H_1: Exchange rate volatility has a significant effect on the liquidity of Oil marketing companies in Ghana.

H_0: Exchange rate volatility has no significant effect on the growth of Oil marketing companies in Ghana.

H_1: Exchange rate volatility has a significant effect on the growth of Oil marketing companies in Ghana.

H_0: Exchange rate volatility has no significant effect on the firm size of Oil marketing companies in Ghana.

H_1: Exchange rate volatility has a significant effect on the firm size of Oil marketing companies in Ghana.

H_0: Exchange rate volatility has no significant effect on the financial leverage of Oil marketing companies in Ghana.

H_1: Exchange rate volatility has a significant effect on the financial leverage of Oil marketing companies in Ghana. Significance of the Study

Significance of the Study

This study will inform investors on profitable investment portfolios in the oil industry as well as inform policymakers to formulate business-friendly policies that will allure to the benefit of oil marketing companies in Ghana. These policies will help place domestic OMCs in an advantageous position within the oil industry. Moreover, policymakers will find this knowledge of enormous value as it will help in analyzing the transmission channel between the variables, thus aid better policy formulation.

Within the academic sphere, this study will serve as reference material for scholars and students to come up with more in-depth researches that extend current research topics in an analogous discipline. Emerging oil-marketing companies can equally adopt it as a guide in reorganizing their operations to meet set performance targets within an embryonic economy such as Ghana.

This work will offer analysts in the commodity market and pricing industry the opportunity to appreciate the role played by the exchange rates on the overall performance of businesses like oil marketing companies in the Ghanaian economy.

Recommendations from this study will inform government agencies to handle Ghana's unstable exchange rate. The Finance Ministry, the central bank, and other agencies will take hints from this study on how to manage the fluctuating exchange rate which will improve the country's balance of trade position as well as lower its oil prices. The policy recommendations will also help boost the performance of the energy sector, its allied sub-sectors, and ultimately industry players.

Delimitation of the Study

The study is limited to the activities of the Ghana Oil Company Limited (GOIL) and Total petroleum which are listed oil companies on the Ghana Stock Exchange (GSE) and under the regulation of the National Petroleum Authority. It concentrates on how the unstable nature of the Ghanaian currency performs against foreign trading partners' currencies and how it has affected the operations and sustainability of oil marketing companies in Ghana. It also examines the forex market to determine the degree of volatility of the currency exchange rates and how it affects the

operations and sustainability of the oil sub-sector of the energy industry. Data will be collected for the last 10 years, which is a period of 2010 to 2019.

Limitations of the Study

The failure to obtain sufficiently uses of cross - sectional units and data sets for the research is one of the study's key limitations, so only a representative of two OMCs were considered. In fact, some of the predictors for some OMCs have redundant data. This can influence the outcome effect of exchange rate volatility on sustainable indicators of OMCS in Ghana.

The study did not consider dissimilar characteristics of the sub-sample which needs to be included in the study for a heterogeneous panel analysis. For example, due to the small sample size, the study could not base its sustainable analysis on some other inherent dissimilar features of OMCs in Ghana. Irrespective of the above-cited limitations, the findings of this study are still imperative.

The study did not consider the role that the business environment (industry specific factors) play in influencing sustainability measures of OMCs in Ghana. This could limit the effect of exchange rate volatility on sustainable indicators (performances) of OMCs in Ghana.

Definition of Terms

Based on the study, it is important to define some key terms within the context of exchange rate volatility and oil marketing companies.

Exchange rate: Exchange rate is the price of a country's money in relation to another country's money. An exchange rate is “fixed” when countries use gold or another agreed-upon standard, and each currency is worth a specific measure of the metal or other standard.

Firm Liquidity: Liquidity means how quickly a firms can access cash. Liquidity might be a firm's emergency savings account or the cash lying with you that you can access in case of any unforeseen happening or any financial setback.

Firm Growth: Growth is a phenomenon that occurs when business owners, employees and outside factors influence the success of a company. A business grows when it expands a customer base, increases revenue or produces more product.

Firm Size: Firm size refers to the scale of business operations; which determines the level of production and consequently the volume of sales. A business may be carried on a large scale or a moderate scale or a small scale.

Financial Leverage: Leverage is an investment strategy of using borrowed money—specifically, the use of various financial instruments or borrowed capital—to increase the potential return of an investment.

Organization of the Study

The study is organized into five chapters. Chapter one presents the background of the study, problem statement, objectives of the study, hypotheses to be tested and significance of the study, the scope of the study and organization of the study. Moreover, chapter two reviews related literature that is both theoretical and empirical evidence on the exchange rate volatility and oil marketing in developing countries. Chapter three deals with the methodology that formulates empirical models and econometric estimation techniques. Chapter four presents the econometric results and discussions on the results. Finally, chapter five gives a summary of major findings, draws the conclusion and ultimately prescribes some policy recommendations.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter critically reviewed literature and relevant concepts that have bearing on the topic under study. It considered a general overview of exchange rate, theoretical frameworks that underpin exchange rate movement, the constituents of the Ghanaian oil industry, a brief overview of oil marketing companies in Ghana and empirical studies regarding foreign exchange rates and the response of Oil Marketing Companies (OMCs). The chapter also provided a conceptual framework that informs the study, a summary of the gap and ended with a conclusion.

Theories Underpinning Exchange Rate

Several theories and models explain how foreign exchange volatility and exposure to its risk can be linked to various economic indicators such as inflation, price and cost among others. In the discussions of exchange rate, the study finds it bearing based on some key theories that are expatiated as follows.

The Purchasing Power Parity (PPP) Theory

This principle emerges from the Law of One Price (LOOP), which attempts to clarify why exchange rate should be equal if two identical goods are compared in different countries and their price is determined in the common currency. In other words, LOOP means that, in different markets, two identical goods or services are sold at the same price, assuming that the tax and transport costs for those two markets are the same. If there are any price inconsistencies between the two markets, the exchange rates would be

changed to allow the goods to be sold in the two markets at the same prices. On this basis, it is further stressed that the exchange-rate ratio between currencies should be equal to the ratio of their buying power. Purchasing Power Parity (PPP) submits that the exchange rate of two countries in other countries is equal to the ratio of two goods or services. However, this does not take the effects of business conditions such as taxes and tariffs into account (Salisu and Ndako, 2018).

Business uncertainties such as tariffs, taxes, prices and quotas are considered in the relative form of PPP and the rate of price increases should be the same. Given these market vulnerabilities, the prices of different goods cannot always be equivalent and observable in the common currency of emerging economies (Lefevre and Chapman, 2017). Although the OMCs buy crude with the same currencies like the US dollar, they sell it on the market at varying rates, reflecting on each nation's economic factors. The Big Mac Index was established by an economist in 1986 who pointed out that the principle of purchasing power states the status of exchange rates at a period in history that is if they are present or correct amount. This is the view that prices in two different countries can reach a level that suits the prices of identical goods (Salisu and Ndako, 2018).

Monetary Theory to Exchange Rate Determination

The monetary approach proposes that exchange rate is set in the course of balancing each nation's stock or total demand and national currency supply. It is presumed that the supply of money in each country is independently determined by the monetary authority of the nation. Specifically, it states that exchange rate is a determinant of supply and demand for certain currencies at

a given point in time. According to this theory, the value of the currency of a nation is a determinant of its supply of foreign exchange market demand. The demand side of the currency could be caused by the country's export of produce. This means that the currency of the exporting nation would be used to pay for the imports of the exporting country.

More exports, on the other hand, would cause the currency of a country to appreciate. The increase in the availability of foreign currency would decrease the relative value of foreign currency supplies in the domestic market leading to an increase in the value of the domestic currency. If there is a rise in demand for foreign currency, OMCs operating in the foreign market will increase the value of their exports and vice versa. High foreign currency demand decreases the value of the domestic currency and, owing to rising exchange rates, will affect the profitability of OMCs. Sankar and Sudalaiyandi (2020) provided a similar a support thus indicate that higher demand for foreign currency result in higher oil prices thus increase the cost of inputs; and final product price increases cause inflation hence devaluing the domestic currency. This will ultimately lead to unfavourable purchasing parity between the domestic country and the foreign country.

Arbitrage Pricing Theory

Reinganum (1981) cited that the arbitrage pricing theory was popularized by Ross (1976) introduced the Arbitrage Pricing Theory, which clarified that markets are inherently competitive and that individuals unanimously assume in the market that the return produced by all economic assets is driven by a linear risk factor combination. This theory was developed to respond to the Capital Asset Pricing Model (CAPM) critique, which defined

a linear relationship between excess portfolio return (single risk factor) and excess asset return (Sabetfar et al., 2011). CAPM stressed that an individual investor should keep all assets in the market. While it is considered as a special case in the theory of Arbitrage Pricing, the CAPM theory involves normal return or quadratic utility function, which is not always justified. Changes in some financial and economic indicators, such as inflation, interest rates, exchange rates, real business and other factors contribute to a risk factor in the financial market (Kasman et al., 2011).

Per the theory of arbitrage, Rashid (2007) study clarified that an exchange rate appreciation volatility is likely to impact the current value of companies and potential cash flow, resulting in an increase in the prices of goods and services. They also highlighted that high interest rates are important to stimulate the inflow of money, resulting in a decrease in the exchange rate. This shows that the disruption of real interest rates can have a positive impact on the relationship between the exchange rate and the average level of trading volume. If this theory is true, a rise in exchange rate would mean that the lower value of potential cash flows for companies will lead to a decrease in prices. Moreover, as interest rates increase as a risk factor, the prices of stocks and exchange rates of oil marketing firms will decline.

Overview of Exchange Rate

Exchange rate has to be expatiated from varied scholars due to its significance to both divides of the world (developed and developing countries). Lilliestam et al., (2020) explained that the exchange rate is known as the exchange rate for the domestic currency of a country. The exchange rate

is then used to determine the relationship of the domestic currency to the rest of the world currency.

In the view of Abdoh et al. (2016), in a given economy, exchange rates reflect the price of the currency of a nation in terms of other currencies. In terms of the domestic currency, known as a direct quotation, it is the word of foreign currency. The price of one unit of foreign currency in terms of domestic currency is expressed in an indirect quotation.

In the same vein, Gabaix and Maggiori (2015) defined exchange rate as how a domestic currency changes for a foreign currency. Primarily, exchange rate can be viewed from the perspective of a nominal exchange rate as well as a real exchange rate outlook. In other currencies, the nominal exchange rate is known as the price of the currency. At the same time, the real currency exchange rate, in real terms, should be defined as the currency price. The currency prices can be quoted as spot or forward exchange rates. The spot exchange rates are those rates currently quoted and exchanged, while the advance rates are those that are quoted, traded and delivery and payment to be made in the future at a stated period (Awad, 2019).

It must be emphasized that exchange rate can either appreciate or depreciate depending on the economy under discussion. If it takes more units of a nation's domestic currency to buy a unit of a foreign currency, the exchange rate of the nation depreciates. On the contrary, currency appreciation means that buying a unit of a foreign currency requires fewer units of the domestic currency of a country. The price of imported goods and services is also decreased by currency appreciation, which in turn decreases the nation's foreign competitiveness.

This implies that the strengthening of the real exchange rate makes the import of commodities cheap and the export of commodities costly. Currency depreciation also makes import products and services more costly and easier to export goods and services that have an effect on productivity, since it is difficult for industries that depend on imported raw materials for production in the economy because the cost of raw materials is high and the cost of production rises there. It also lowers the benefit in the economy of businesses or sectors. Therefore, fluctuations in the exchange rate also create problems for a nation's producers and investors because it affects their companies and key investments in the economy (Mensah et al; 2010).

The use of demand and supply powers to assess exchange rates in the oil industry OMCs buy crude in dollars and sell them in the local market for local currencies would result in either a gain or a loss in the trade of the oil commodity because of the exchange rate differential. This suggests that the use of demand and supply forces could have a positive or negative impact on the sustainability of oil marketing companies in deciding the exchange rate in the market.

Evolution of Exchange Rate System in Ghana

It is important to recognize the different exchange rate regimes in Ghana post-independence while evaluating the exchange rate fluctuations in Ghana.

Fixed Exchange Rate Period between 1967 and 1982

The overvaluation of the currency was one of the most pressing economic problems facing all the post-independence governments of Ghana. Ghana broke with the British pound sterling in 1961 and related the value of

the Cedi to the US dollar. The real value of the cedi dropped as Ghana's terms of trade collapsed in the 1960s, and thus the nations embraced the fixed exchange rate system.

The Cedi was pegged against the US Dollar between 1964 and 1982, under the fixed exchange rate system. This was accompanied by periodic devaluations and currency-rationing exchange controls and the elimination of the cedi's convertibility. There was pressure on the exchange rate during these years when the country was operating a fixed exchange rate regime, leading to currency overvaluation and rigidly high inflation rates. As fixed exchange rates do not inherently contribute to lower inflation, this also contributed to a lack of stability at domestic price levels. As a result, trade-offs between other nations became an issue due to the high inflation rate and low foreign competition coupled with the country's high unemployment rate.

Period of Crawling Peg Exchange rate between 1983 and 1992

Between the years 1983 to 1992, the crawling peg exchange rate regime was implemented because the fixed exchange rate mechanism could not address the unemployment crisis and the country's high rate of inflation. Efforts were then made to devalue the cedi, which was defined by adjustable pegs and partial capital account transaction exclusion or restriction. This was in line with the sale of foreign currencies on the basis of a two-tier system of exchange rates, with one rate for necessities and one rate for non-essentials. The problem of inflation and unemployment was still high under the crawling peg regime and domestic import competitive industries were still restricted to importing raw materials for production. Persistence with the crawling peg

exchange rate mechanism was also the question of equilibrium balance of payment.

Period of Regulated Floating Exchange Rate between 1992 and 2009

The introduction of the inter-bank market, launched in 1992 under the new constitutional period, was the third step of the exchange rate regime. The Bank of Ghana has committed itself to maintaining a regulated system of floating exchange rates without a pre-announced exchange rate route. The Bank of Ghana (BoG) only works to smooth short-term exchange rate fluctuations in order to achieve the inflation target within the given balance of payments or the international gross reserve targets. In 2002, also in nominal terms, the exchange rate displayed large degrees of appreciation. "Fourth and Fifth Reviews under the Three-Year Arrangement under the Poverty Reduction and Growth Facility of the International Monetary Fund (IMF) and Request for Waiver of Non-Compliance with Performance Criteria Paragraph 28 reads as follows: "The authorities define their exchange rate regime as a controlled float, with no pre-announced exchange rate path.

Under this regime, foreign exchange market activity should be limited to the short-term smoothing of the foreign reserves and the achievement of the target of the international reserves. As noted earlier, however, there has been relative stability of the nominal exchange rate over a long time concerning the US dollar. In such a situation, the authorities have expressed some concern about the potential effect on the productivity of the real appreciation of the exchange rate. However, they agreed with the workers that, to sustain and boost competitiveness, reliance should be placed on productivity growth in the sense of relative macroeconomic stability.

Conceptual Review

This section provides review on some key conceptual terms that have bearing on exchange rate volatility and operational indicators.

Exchange Rate Volatility

Volatility in foreign exchange rates can be explained as the adjustment in exchange rates as a result of currency uncertainty (Gaies et al., 2020). This uncertainty has an impact on the cash flows of undertakings and thus, on the value of such undertakings. Theoretically speaking, there is a common belief that volatility in exchange rates is a very significant area of macroeconomic instability that businesses should take into account. Some economists assume that changes in exchange rates will lead to shifts in market prices, directly affecting foreign organisations, importers and exporters of inputs, on the one hand, and indirectly affecting other companies, on the other (Servén, 2003).

Conglomerates are encouraged to take advantage of the global network of companies to transfer their activities outside the domestic environment so that, even in tough times, they can stay competitive. As they have diversified sources of income and financial risk, the company's adventure into new markets will fairly improve its chances of profitability. This condition has prompted the management of global companies to focus on strategies to ensure the protection of cash inflow from different investments (Lee and Shin, 2018). In the oil sector, exchange rate volatility often affects companies' payments to suppliers, because if the exchange rate is higher at the time of payment, the company would need more cedis to buy fewer dollars to pay its debt. This impacts their profitability and the Oil Marketing Companies' (OMCs') total cash flow in Ghana.

Oil Industry in Ghana

In Ghana, two major regulatory bodies oversee the activities of Ghana's oil-related companies. These are the Petroleum Commission (PC) and the National Petroleum Authority (NPA). All the upstream oil operators in Ghana are supervised by the Petroleum Commission. The Commission was set up in 2011 by an Act of Parliament (ACT 821) to control and manage petroleum resources as well as to coordinate petroleum policies. The Petroleum Commission, as part of its core mandates, ensures that upstream petroleum operators in their operations comply with health, environmental protection standards and ensures that those activities comply with rules, guidelines and agreements.

An Act of Parliament (ACT 691) was established in 2005 by the National Petroleum Authority (NPA) to track and regulate the country's oil activities, along with the regulation of the prices of oil commodities in Ghana. The National Petroleum Authority controls, supervises and tracks downstream petroleum industry operations. The NPA is charged with controlling the price ceilings of petroleum products in compliance with the petroleum pricing formula as part of its duties. In order to allow them to operate in Ghana, they also give licenses to oil marketing companies and bulk distribution companies.

A third body is known as the Ghana National Petroleum Corporation, in addition to these two regulatory bodies (GNPC). An Act of Parliament in 1984 created the Ghana National Petroleum Corporation as a statutory body (PNDCL 64). The corporation's core objective is to carry out the discovery, development, processing and disposal of petroleum products. It is also to ensure that the nation gets the greatest profit from the growth of its oil wealth

(Ghana National Petroleum Corporation, 1983). The GNPC currently holds a total of 13.75% of the jubilee oil fields, consisting of 10% carrying interest and 3.75% interest potential. The Petroleum Commission controls the upstream operations of all operators, including GNPC.

Oil Marketing Company

Oil Marketing Companies act as intermediaries between bulk distribution companies and end customers. The bulk dealers supply petroleum products to the petroleum distributors, who in turn sell them to the general public. Most of the retail sale of petroleum products in Ghana is carried out through the numerous filling stations operated mainly by Oil Marketing Companies. In Ghana, there is an industrial group of companies selling petroleum. The group is regarded as the Association of Oil Marketing Companies (AOMC). Its key aim is to help direct downstream oil policy, legislation and regulation, as well as to research to strengthen the downstream sector.

The association partners and interacts with the major stakeholders of the oil industry in Ghana, including the Ministry of Energy, the Ministry of Finance and Economic Planning, the Ghanaian National Petroleum Corporation, the National Petroleum Authority, etc. These collaborations are aimed at ensuring that the common interests of the oil-marketing firms are properly safeguarded. Currently, 59 nationally accredited oil-marketing companies are members of the association, including large and minor oil marketing companies. Although members of the association are presumed to benefit from corporate recognition, the association's membership is not mandatory for an oil marketing company.

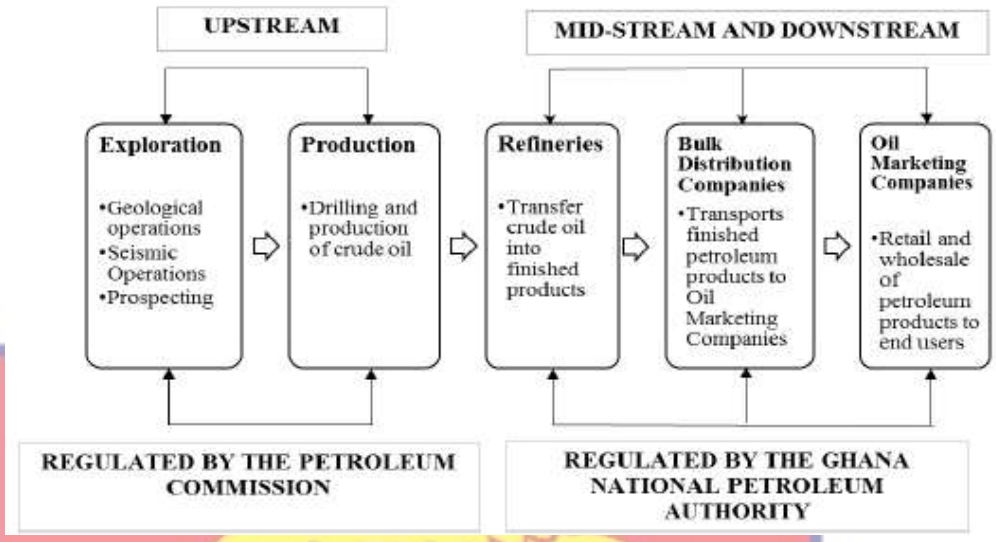

Figure 2: Upstream, Midstream and Downstream of the Ghanaian Oil sector

Source: Adopted from Ofori-Parku (2016)

Managing Exchange Rate Risk Exposure

Given the effect of exchange risk, each oil-marketing firm aims to minimize the degree of exchange rate risk to which they are exposed. To reduce short-term exposure to volatility in exchange rates, this can be accomplished by entering into a forward foreign exchange arrangement with their trading partners. Forward contracts are meant to serve as a cover against the cash flow of assets and liabilities of a company (Chira, 2009)

According to Burge et al., (2009), three main methods can be used to mitigate exchange rate risk. The Active strategy where the importers of oil products hedge the expected foreign exchange through the forward market of passive strategy. The second option is that oil-marketing firms could arrange to settle foreign transactions in the local currency, by changing foreign currencies into domestic ones at the spot exchange rate, allows a company to decide to adopt a do-nothing strategy, which is considered the easiest of the approaches.

The third could be the active strategy; in this scenario, the oil-marketing firm depends on estimation to choose hedge prices. This strategy will hedge or agree to pay in local currency for international transactions based on what it expects future rates to be. With the help of foreign procurement techniques, oil-marketing firms have managed their exchange risk exposure in the last few centuries. This helps such companies, by taking advantage of its subsidiaries in other countries, to increase its competitive offer to carry out transactions that boost its marketing strategy for facilities, product design and components.

Suppliers based in other nations may assist an oil firm to minimize its degree of risk exposure to foreign currency. The international source would be a good strategy in this situation of risk exposure, particularly when the oil firm can easily access taxes, customers and can circumvent taxes, tariff charges and trade restrictions. For this analysis, the Flow Oriented Model developed by Dornbush and Fisher (1980) as cited by Lesotho (2016) is the most appropriate theory among the various theories discussed. This theory explores how changes in exchange rates impact the competitiveness of industry and trade-off positions in the foreign market. The theory also further explains that exchange rate volatility has a significant influence on the cash flow and efficiency of an entity.

Empirical Review

There have been some evidential studies that look at the connection among exchange rate volatility, liquidity of firms, firms size, growth and the financial leverage of firms.

Exchange Rate Volatility and Firm Liquidity

In analysing the connection between foreign exchange rate and the financial performance of the Airlines Business in Kenya, Muigai and Cherono (2019) using a case study as a research design on the same risk exposure problem. OMCs are highly vulnerable to this risk and if they adhere to financial risk management procedures, will be able to better protect their cash flows and business losses resulting from the risk.

The susceptibility of the multinational firm to exchange rate risk, but how it is measured, is inevitable. Research by Isaac (2015) suggested that the company's cash flow is the relative exchange rate exposure in the estimation of the company's production according to its reaction rate to exchange rates and thus the cash flow realized from operating activities and cash flow from receivables. Operating cash flows are further turned into an effect of change and a competitive effect. This will indicate whether the cash flow exposure depends on the competition policy and exchange rates of the business in the domestic economy and the selection of markets and products or services by the company. Four are extremely likely to be exposed to trade risk in every 18 industrial settings in the United States, according to Dembe et al. (2005). One of the determinants of the competitive drive of companies is the movement in exchange rates, which in turn affects the export and import share of the four industrial groups.

Nevertheless, the strength of the effect is often dictated by the business conditions of the industry and the level of competition. If their competition rate is strong, companies could experience a high level of unexpected publicity, especially in the oligopoly sector. This is because, in this market, the

price level will always be set at a mark-up to allow organizations to take the fluctuations of exchange rates into account. To retain its market edge, the globally engaged oil marketing company should take advantage of risk management practices and diversify its investments. This will encourage businesses to use the price differential strategy to minimize the extent to which their profits and a stronger market position than their competitors will be impacted by the exchange revolution.

Exchange Rate Volatility and Firm Growth

A second example from the Mongeri (2011) report, which studied the effect of the foreign exchange rate on the performance of the Nairobi Stock Exchange (NSE) stock index using a longitudinal analysis model, also concluded that the exchange rate and the performance of the stock market had a positive relationship. Since the stock prices of OMCs have a direct impact on their competitiveness, both in the international and local markets, exchange rates can undermine the clearly stated profitability of OMCs.

Okech and Mugambi (2016) observed that exchange rates had a significant influence on market efficiency and further explained that, contrary to the effect of the negative relationship between currency rates and corporate stock prices, currency fluctuations have had an impact on prices of goods and services. This positive effect of exchange rates on businesses could be temporary, as price changes may lead to a long-term decrease in sales and harm OMC revenues.

Onyancha (2011) also analysed the impact of foreign exchange gains and losses on the financial results of non-governmental organizations using a survey research design methodology (NGOs). The results show that the risk of

exchange rates reduces the quality of the project and the movement of exchange rates has had an immersive impact on the financial performance of NGOs. As prices are exchanged in foreign currencies, such as the US dollar, and sold in local currencies on the international trading market, oil-trading companies are more vulnerable to the risk of exchange rates.

Cosenz and Noto (2018) found that at least 75 percent of companies in the United Kingdom took account of the effect of exchange rates on their operations when drawing up plans for their operations in terms of strategy formulation. They often take into account concerns such as the competition's organizational scale, their strategic drive, and comparative cost advantage. A study was conducted by Lasserre (2017) to assess how businesses would respond to the new market revolution and the rising number of multinational companies facing the challenge of exposure to exchange rates in Finland. They also discovered that a big problem is trade risk management. Exchange risk exposure control should be of utmost importance to global corporations and oil marketing firms in particular. This would make it easier for them to reduce the cost of their inputs, reduce costs and make them competitive.

By employing co-integration and correlation models, Basher et al. (2016) investigated the connection between crude oil prices and its allied products and the US dollar exchange rates. The findings were not in a strong position to show a significant impact on all oil products. In an analogous study, Zhang (2020) showed that the dollar exchange market has some effect on the pricing of oil products. Another study by Hong (2002) chose a GARCH co-integration model and investigated the effect of US dollar exchange rate

and oil products prices. From the international market, the US dollar had a significant effect in determining the price levels of oil products.

In a study on South Africa, Ngondo and Khobai (2018) used an ARDL testing model to undertake an exploration into the processing of data on exports and exchange rates. In testing their relationship, a good correlation was demonstrated between the exchange rates level and the level of exports of trading partners. Moreover, using GARCH estimation method was used to analyse changing the average standard deviation in predicting the extent of volatility especially identifying the imperative beneficial measure of the connection between movement in export levels and the volatility in exchange rates.

An akin study on the effect of dollar rate on oil prices was also analysed by Imobighe and Fiia (2015) who contended that higher exchange rates after higher import levels would push the price of oil to upsurge, affecting its share of demand and supply. From the demand perspective, oil prices will decline in other countries' domestic currencies as the worth of the dollar escalates and, as an effect, requests for increasing oil prices. The implication is that as global demand for oil products increases, there is a corresponding upsurge in the prices of oil products.

Exchange Rate Volatility and Firm Size

For the largest 1000 Turkish firms between 1993 and 2005, Caglayan and Demir (2014) conducted an analysis of the impact of exchange rate volatility on firm productivity. They essentially discovered that the volatility has a negative impact on Turkish firm productivity and that the effect is greater for export-oriented firms than for other types of firms.

Exchange Rate Volatility and Firm Financial Leverage

Exchange risk analysis has shown how important it is to monitor a business's risk exposure. In Boyd et al., (2001) study, it was discovered that exchange rate risk is a major activity in the financing segment of some large companies in Asia, America and Britain. This focused on four main objectives of foreign exchange risk management strategies, including managing cash flow volatility, reducing costs, protecting fluctuations in earnings, and reducing risk exposure to foreign exchange risk. Results from their research showed a negative correlation between financial performance and foreign exchange risk.

Two separate studies explain the impact of exchange rate risk on the stock price. Sekmen (2011) analyzed the effect of exchange rate fluctuations on the return on stock prices, using the 1980-2008 ARMA model. It was concluded that uncertainty in exchange rates adversely affects the return on stock prices of American companies.

It was found that almost all organizations hedge exposure to exchange risk in studies by Choi et al., (2019) on the propensity of firms to hedge as a way to escape the negative effect of currency rates. In a related study, 48 were partially hedged for 69 companies in Australia, while 21 were completely hedged, it was revealed. It is estimated that most businesses hedge no more than 25% of what they consider to be risk exposure (Álvarez-Díez, 2016), and most businesses want a short-term hedge for a maximum of 90 days, although this research does not show why businesses are inclined to hedge.

Another research on a Swiss business on hedging activities by Bishev and Boskov (2016) found that most of the factors behind organizations need to

hedge the risk of foreign currency. They argued that these include making it easy to plan, reducing losses in the cost of financing their operations and ensuring cash flow in their companies to prepare. All of these results suggest that it would be very difficult to completely remove the company's exchange risk exposure, in particular to the oil sector of the economy, but instead, it can significantly reduce its effects.

Research on the understanding of risk exposure was released by Barak (2017) on the chief financial officers of multinational companies. They suggested that multinational corporations' economic officers have more than an economic awareness of the hazards they face in the course of transactions. They explained that multinational companies use sophisticated product portfolios to protect against the degree of risk raised by translation exposure and economic exposure while using forward hedging strategies to mitigate the risk involved in hedging strategies. To be able to effectively manage exposure to exchange rate uncertainties, the management of oil marketing companies needs a better understanding of the risk they are exposed to determine the hedging strategy to be introduced.

A study by Alagidede and Ibrahim (2017) on business hedging strategies in times of risk exposure shows that most businesses use forward contracts in Ghana to a large degree to hedge against transaction exposure, but few instances have been found to have used economic exposure to hedge to highlight the hedging strategies used by businesses. In this case, economic exposure would be very difficult to use because a lot of approaches will be required, ranging from growth, marketing and financing.

Bartram and Bodnar (2007) used regression to determine how companies react to exchange rate exposure by considering the return on stocks and assets while analyzing how companies react to exchange risk exposure; they stated that there is no relevant difference in exchange rate fluctuations in the statistical outcome. The approach they use does not have significant practical significance. In coming to conclusions from these studies, they added that measuring the company's cash flow exposure to long-term data exchange rates would provide statistical variables with a more reliable result. Their claim is contrary to Oh and Lee (2004), whose research on Korean companies shows that a better result and elucidation than that of monthly returns is given by measuring risk exposure through the use of daily data records.

Studies have been conducted to analyze the price of oil and how the volatility of the US dollar is linked to it. Both researched how the price of oil is determined by the movement of exchange rates across the balance of payments in Bal and Rath (2015). They assert that it adds to wealth from the country selling the commodity to the country purchasing the product as the price of oil rises, which they say affects exchange rates. This will lead the US dollar to rise in value over the domestic currency in the short run. They demonstrated that high revenue can eventually lead to high expenses over time as they save and invest. For example, if Ghanaians purchase more goods from the US, it means that more Ghanaian Cedis will be converted to US dollars to buy goods; this will lead to depreciation in the Ghanaian Cedis.

In other circles, other empirical studies have attempted to analyse the effect of oil prices on the exchange rate. However, there is an influx of more studies that are being conducted to analyse the impact of exchange rate on oil

prices. For example, Cunado and de Gracia (2015) explored a report on the direct effect of exchange rates on oil prices, considering the impact of US dollars on industrial productivity at US oil refineries. The findings indicated that the dual variables have a discrete relationship. This can be attributed to the notion of higher demand for oil products in the realms of unconventional venture portfolios.

In one of the West African countries specifically Nigeria, Agu (2012) investigated the relationship between imports and exports in a balanced economy. He indicated that rational rate interpositions should be able to set apart the effect of real exchange rates. There should be a delivery of economic undertakings and the use of resources to control inflation hikes and to minimise unemployment levels to keep an internal balance. An economy's capacity to hold balance payments at a steady level to counteract monetary shortfalls and deficit financing will ensure its economic sustainability. To establish the relationship between real exchange rates and exports, Trimble et al. (2016) used the GARCH model in South Africa to conclude that there is a high negative export burden specifically in the long term.

Over 20 years, Nkoro and Uko (2016) employed the square residual Autoregression to evaluate the performance of the stock market in the United States. The study found a negative relationship between exchange rate and the stock market partly due to hedging mechanisms which can moderate the effect of exchange rate and quantity of volatility of exchange rate. In a similar experiment in Pakistan and India, there was no positive short-term connection between stock prices and exchange rates.

In assessing the performance of stock market and its relation to exchange rate movement, Sichoongwe (2016) discovered a direct connection between the two aforementioned variables. Whiles in a team study by Asamoah et al. (2016) on the Ghana stock market, the exchange rate movement (1995-2005) had some influence on economic indicators. The findings from the study indicated an inverse connection between return on a stock and the manner of exchange rates. Such connections could serve as a monitoring instrument for investment players in minimising risk in the financial market. Even though the aforementioned studies are insightful, they did not concentrate on the effect of exchange rate on oil marketing players especially oil marketing companies.

Several studies have been conducted on the relationship between exchange rate volatility and market efficiency, the effects of exchange rate volatility on NGOs and the relationship between exchange rate volatility and stock pricing in other countries, as shown in the reviewed literature. The above-reviewed empirical studies were conducted in varied jurisdictions with a special focus on some developing countries and developed countries apart from Ghana. Therefore, the study is to examine the effect of the exchange rate on oil marketing companies in Ghana. The fluctuation and instability that characterize the foreign exchange market and money supply, the compensating explicit and implicit effects on all sectors of the Ghanaian economy, are of great concern and extreme interest to the government, oil importers, oil marketing companies and the general citizenry. The astronomic and constant increase in the prices of oil products has unbearable economic hardships on stakeholders engaged in the marketing of oil products who have inadequate

knowledge on how foreign exchange rate impacts their liquidity level and growth level. Therefore, this study is timely to provide some additional information for oil marketing companies in Ghana.

Conceptual Framework

The conceptual framework shows the effect of exchange rate volatility on Oil Marketing Companies in Ghana using liquidity, growth, firm size and financial leverage as measures of the sustainability of OMCs.

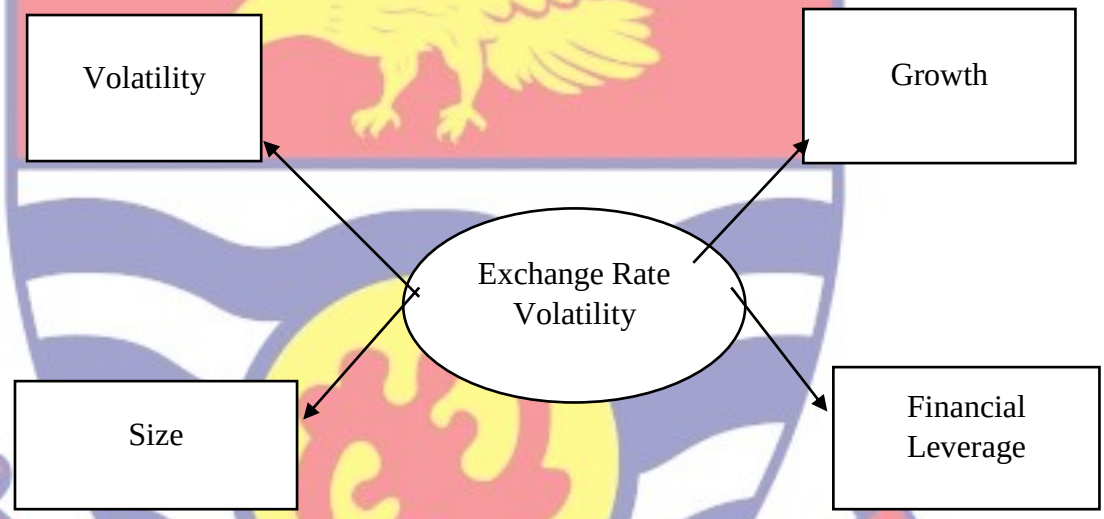

Figure 3: Conceptual Framework

Source: Author's construct, 2021

In the figure 3 above, exchange rate volatility is considered the explanatory variable which has influence on the other four dependent variables namely the liquidity level of the OMCs, the growth level, its size and the financial leverage that the OMC experiences.

Gap and Summary

The topic of exchange rate volatility and oil marketing companies in the Ghanaian context has not received thorough research in terms of arduous empirical research. However, there have been series of researches undertaken,

and it is unclear if the dearth study on this very important topic is because oil importers and marketing companies lack in-depth knowledge to engage both academicians and researchers to highlight the importance of exchange rate in the marketing of oil products in Ghana.

Prior studies have concentrated on stock markets and prices of goods and services without focusing on Oil Marketing Companies (OMCs) in Ghana. Most of these researches have also identified factors that determine exchange rate as well as the effect of exchange rate volatility on macroeconomic variables in Ghana. This study is unique because it focuses on the oil industry by assesses the effect of exchange rate volatility on oil marketing companies in Ghana. This research is novel and will be a revealing study to oil industry players, oil marketing companies and industry investors in Ghana.

Conclusion

The goal of this chapter was to review relevant literature that informed the basis of this study. Major concepts concerning the study objectives have been discussed. Some of the relevant issues discussed include an overview of exchange rate, theoretical framework that underpins exchange rate volatility, exchange rate regimes in Ghana, perspectives from both the oil industry in Ghana and oil marketing companies, empirical evidence relating exchange rate volatility and a conceptual framework that gives a better understanding of the topic under study.

CHAPTER THREE

RESEARCH METHODS

Introduction

This chapter's main purpose is to present the appropriate methodological framework for conducting the research study. Methods and tools used in the study are the issues that come under this section. The detailed form of the model's theoretical and empirical description, model variables, data types and sources, estimation techniques and data analysis tools are clearly presented.

Research Approach

The study adopts the quantitative research approach. The quantitative research approach has some level of superiority over qualitative research approach in areas of replicability, fairness and generalizability of outcomes (Tracy, 2019). Based on view of Chami (2017), the study adopts the quantitative research design in order to desist from using personal experiences, preferences, insights and predispositions to achieve objectivity in the study and inferences that are drawn.

Quantitative research designs are expressed in descriptive, experimental, quasi-experimental or correctional, where subjects measured at prior and post treatment levels. This study finds its bearing in the context and assumptions of the positivists' philosophy, which supports the application of quantitative methodology.

Research Design

In terms of research design, the study adopts that correlational research design. Correctional research design, as described by Saunders et al (2009), is

used when the aim of the study is to determine whether or not there is/are causal construct(s) between variables, while also allowing for flexibility and aiding in the discovery of new relationships in the data. Hence, the explanatory research approach is used to investigate into the effect of exchange rate volatility on oil marketing companies in Ghana.

Population

In Ghana, there are ninety-five (95) Oil Marketing Companies. Ghana Oil Company (GOIL), Total Petroleum, VIVO, Radiance Petroleum, Danicom Limited, Delkoma Enterprise, Otega Oil Company Limited, Azumah Resource Limited, PatroRaz, Kumaya Oil, Oxytane Ghana, IES energy service Limited, Nasona Oil, Glory Oil, Industrial Allied Service Limited, Unity Oil, and Pacific Oil are just a few of them. Companies in Ghana's oil industry can be classified further based on their ownership: they can be a public-private joint venture, a private enterprise, or an indigenous or multinational firm.

Sample Size

The research used purposive sampling strategy to select two (2) Oil Marketing Companies out of the total population to undertake the study. The GOIL and Total Petroleum Companies were selected as cases for this study. These two oil marketing firms were selected based on their major production capacity as well as the market share occupied by them in the Ghanaian oil marketing industry.

Sampled Oil Marketing Oil Marketing Companies

Ghana Oil Company Limited (GOIL)

GOIL is a Ghanaian-owned public company that trades on the Ghana Stock Exchange. In June 1960, AGIP Ghana Company Limited was formally

incorporated as a Limited Liability Corporation to sell petroleum and related goods such as oils, liquefied petroleum Gas (LPG), and lubricants, primarily in Ghana. AGIP SPA of Italy and SNAM S.P.A of Italy owned the shares, which were later sold to hydrocarbon international in December 1968. Both companies' shares were purchased by the Ghanaian government in 1974. In 1976, a special resolution was passed renaming the company Ghana Oil Company Limed (GOIL). By August 2007, a new resolution had given it the go-ahead to become a public corporation. With over 300 retail outlets across the country, it currently has the largest market share in the Oil distribution subsector, providing various services in Fuel, Lubricants, Gas, and Bunkering.

Total Ghana limited

Total Petroleum Ghana Limited was founded as a private limited liability company in December 1951. The Ghana Stock Exchange currently lists it. Oil and gas exploration, development, and distribution are the company's core businesses. It operates over 230 retail locations around the country, selling fuel and lubricants, providing expert advice to consumers, and recently introducing the Total Card, an electronic and convenient payment system. It also provides tire and lubricant bay service.

Sampling Strategy

According to Taherdoost (2016), the purposive Sampling Strategy is a quasi-sampling approach in which a researcher chooses a sample from a given population based on their assessment; it's also known as judgemental sampling. The researcher chose GOIL and Total Petroleum because they are the oldest and largest Oil Marketing Companies in terms of market share, respectively (i.e., they control over 50 percent of the market in Ghana - GOIL

has a 28 percent market share and Total Petroleum has a 23.5 percent market share). Furthermore, since GOIL is a domestic company and Total Petroleum is a global corporation, using these companies will provide a fairly accurate picture of the Oil Marketing Companies. As a result, the researcher will be able to compare the findings. In addition, the researcher spoke with 20 experts from the respective OMCs to gain a balanced view of changes in exchange rates on Ghana's oil marketing companies' long-term sustainability.

Data Collection Instrument

Annual reports of the two Oil Marketing Companies were essential to getting data for the data analysis for this study. Moreover, a structured interview guide was used to gather data from the 20 selected experts from the two oil marketing firms adopted for this analysis. In a structured interview guide, the researcher employed detailed and rigid questions to achieve the study's objectives.

Data Collection Procedure

Secondary and primary data were used in this analysis. Secondary data, according to Saunders, Lewis & Thornhill (2003), can be both raw and written summaries of an organization's activities. To compute the Oil Companies' liquidity, size, growth, and financial leverage, the researcher will extract information about the financial transactions of the two companies involved from their audited financial statements. The Bank of Ghana's website can also be used to obtain historical exchange rate movements. Interviews were used to gather the primary data.

Data analysis Technique

Statistical Package for Social Science was used to analyze the results (SPSS). The required financial ratios and exchange rate adjustments from 1990 to 2015 were computed using the data obtained from the companies' financial statements. For study and interpretation, this was entered into SPSS to compute descriptive, linear correlation, and regression statistics. The data from the interviews was transcribed and coded into SPSS for easy review and analysis.

Specification of Empirical Model

In research work, there are two main known models used for analysis: time series and cross-sectional models. The aforementioned models are based on the characteristics of each data collected (either time series or cross sectional). This study focuses on two main oil marketing companies over a period of time hence a panel data is developed. Adam and Owusu (2017) admits that a panel data pools the characteristics of both cross-sectional data and time series data. In the context of this discussion, when a study concentrates on using data from more than a unit over a period then a panel data is preferred. This study therefore looks at two units (oil marketing companies) and time series data from 1990 to 2015 of each unit, thus, panel model is employed. The study considers the period (1990-2015) due to the availability of official data from the two oil marketing firms.

Panel Data Analysis

Panel data analysis is considered to be the most efficient analytical technique for studies that extract and handle data from numerous sites, frequently monitored over a specified time frame, it was chosen for this

investigation (Stock & Watson, 2015). This analytic framework is effective in handling data panel set consisting of data for **n** different entities observed at different periods of **T**, which Stock and Watson (2015) illustrate below:

$((X_{it}Y_{it}), I = 1 \ldots n \; and \; t = 1, \ldots T$ (1)

Deducing from this equation, a simple linear data panel model with one explanatoryvariable can emerge as follows:

$Y_{it} = a + U_{it}$ (2)

The capacity to boost the quality of the findings regardless of sample size, the degree of freedom, and the ability to cope with multicollinearity between independent variables are just a few benefits of the panel data analysis in addition to the fact that it matches the research (Hsiao, 2007). In comparison to stand-alone time series or cross-sectional data analysis, it delivers more sophisticated analyses and can address the influence of variable bias even with imbalanced panel data. Panel data analysis offers a more accurate assessment and information of the variables in addition to capturing the behavior of the variables (Greene & Hensher, 2010; Hsiao, 2007). The appropriateness and aforementioned benefits of the panel data analysis suggest that utilizing it for the analysis can help to produce accurate and legitimate results.

Estimation technique/models for panel data analysis

Fixed and random effect models are the methods for panel data analysis that are most frequently endorsed and employed (Torres-Reyna, 2007; Schmidheiny & Basel, 2011). It is crucial that the study uses random and fixed effect models for the analysis because it uses panel data from two separate oil marketing companies. The fixed effect model presupposes that the model's

coefficient and the unobservable parameters are both estimated. The non - observable country-specific influence is supposed by the random effect model to be a random disturbance that is spread independently of the peculiar disturbance that varies over time and between countries (Schmidheiny & Basel, 2011). The assumptions behind the country-specific effect formed the basis for the adoption of both the fixed and random effect models. To further evaluate which estimate among the outcomes from the fixed and random effects should be accepted, the Hausman test was applied

Fixed and Random effects models

A panel data model is used to analyze a fixed and/or random effect for each variable separately. The essential distinction between the models for fixed and random effects is drawn by the use of dummy variables. In a fixed-effect model, the intercept and the error element in the random variable both include a parameter estimate of a dummy variable. Nevertheless, the slopes are constant across groups or periods in both models of fixed and random effects. The following describes the mathematical model of the models for fixed and random effects.

Fixed effect model:

$$= (\alpha + \mu_i) + X' \beta + v_{it} \quad (3)$$

The fixed effect, which is also known as Least Squares Dummy Variables (LSDV) model, is a data analysis panel where each entity controls variables that are constant over time but differ across entities (Stock & Watson, 2015).

Random effect model:

$$y_{it} = \alpha + X'_{it} + (\mu + v_{it}) \quad (4)$$

With the random effect, the panel data analysis handles the constants for each section as a random parameter instead of fixed (Asteriou & Hall, 2006). In this case, μi is a fixed or random effect specific to the individual (group) or the period excluded in the regression and the errors are distributed separately and identically, $vit \sim IID(0, \delta^2)$. Besides these models are post estimation techniques or tests.

Post Estimation Technique

To make sure that the predictions from the regression are reliable and consistent, the following post estimation tests are carried out. The tests assist in determining the model's fitness, for instance, when deciding whether to utilize a random or fixed effect.

$$LM = (b_{LSDV} - b\ random)' \dot{W}^{-1} (b_{LSDV} - b_{random}) \sim X^2(k) \quad (5)$$

$$= Var\ [(b_L - b_{random}] \quad (6)$$

$$= Var\ (b_{LSDV}) - Var\ (b_{random}) \quad (7)$$

The difference between the estimated covariance matrices of the LSDV (robust model) and GLS is represented by the symbol in equation (5). (efficient model). This, however, follows the chi-square distribution with k degrees of freedom. According to the formula, a Hausman test determines whether the unbiased fixed-effects estimates and the random effects estimates differ significantly. The individual effects I are strongly correlated with at least one of the regressions in the model if the null hypothesis, which claims there is no association, is rejected. Following the Hausman test for both the random and fixed effect models, the significance level for both models was lower than the threshold of 0.05. This suggests that the random effect is erratic, which causes the null hypothesis to be rejected. The use of the fixed

effect is now possible. The difference of covariance matrices, however, may not be positive definite, according to Greene and Hensher (2010), which is a limitation of the Hausman test.

Empirical Model Specification

Based on the panel data analysis method explained above, the effect of exchange rate on the four (4) operational variables (liquidity, firm size, growth level and financial leverage) were investigated. The model of the equation, which is based on the model of panel data analysis is explained as model specification for exchange rate on firm liquidity, exchange rate on firm size, exchange rate on firm growth and lastly exchange rate on financial leverage of firm.

Model specification for Exchange Rate Volatility on Firm Liquidity

$$LIQ_{\text{it}} = B_0 + B_1 EXCHR_{it} + B_2 NIR_{it} + B_3 LR_{it} + B_4 FD_{it} + \varepsilon_{it} \quad (8)$$

The functional form of the model is specified as:

$$EXCHR_{it} = (ER_{it},) \quad (9)$$

Where,

$$EXCHR_{it} = f\,(ER_{it}) \quad (10)$$

$$LIQ_{\text{it}} = B_0 + B_1 ER_{it} + B_2 NIR_{it} + B_3 LR_{it} + B_4 FD_{it} + \varepsilon_{it} \quad (11)$$

Where β_1 through to β_4 are the parameters or the slope of the independent variables. β_0 is the intercept, which implies that if all the other variables are zero, the coefficient β_0 will explain the dependent variable in the equation. Theoretically, the coefficients of β_1, β_2, β_3 and β_4 in equation (11) are expected to be negative. Logarithmic transformation was done on the control variables (NIR, LR and FD) in equation (11) to account for the non-linearity in the variables that were selected. The coefficient (β_1) was expected to be

negative, implying that exchange rate volatility adversely affected oil company firm's liquidity level.

Model specification for Exchange Rate Volatility on Firm Size

$$FZ_{\text{it}} = B_0 + B_1 EXCHR_{it} + B_2 NIR_{it} + B_3 LR_{it} + B_4 FD_{it} + \varepsilon_{it} \quad (12)$$

The functional form of the model is specified as:

$$EXCHR_{it} = (ER_{it},) \quad (13)$$

Where,

$$EXCHR_{it} = f(ER_{it}) \quad (14)$$

$$FZ_{\text{it}} = B_0 + B_1 ER_{it} + B_2 NIR_{it} + B_3 LR_{it} + B_4 FD_{it} + \varepsilon_{it} \quad (15)$$

Where β_1 through to β_4 are the parameters or the slope of the independent variables. β_0 is the intercept, which implies that if all the other variables are zero, the coefficient β_0 will explain the dependent variable in the equation. Theoretically, the coefficients of β_1, β_2, β_3 and β_4 in equation (15) are expected to be negative. Logarithmic transformation was done on the control variables (NIR, LR and FD) in equation (15) to account for the non-linearity in the variables that were selected. The coefficient (β_1) was expected to be negative, implying that exchange rate volatility inversely affected oil company firm's size.

Model specification for Exchange Rate Volatility on Firm Growth

$$FG_{\text{it}} = B_0 + B_1 EXCHR_{it} + B_2 NIR_{it} + B_3 LR_{it} + B_4 FD_{it} + \varepsilon_{it} \quad (16)$$

The functional form of the model is specified as:

$$EXCHR_{it} = (ER_{it},) \quad (17)$$

Where,

$$EXCHR_{it} = f(ER_{it}) \quad (18)$$

$$FG_{\text{it}} = B_0 + B_1 ER_{it} + B_2 NIR_{it} + B_3 LR_{it} + B_4 FD_{it} + \varepsilon_{it} \quad (19)$$

Where β_1 through to β_4 are the parameters or the slope of the independent

variables. β_0 is the intercept, which implies that if all the other variables are zero, the coefficient β_0 will explain the dependent variable in the equation. Theoretically, the coefficients of β_1, β_2, β_3 and β_4 in equation (19) are expected to be negative. Logarithmic transformation was done on the control variables (NIR, LR and FD) in equation (19) to account for the non-linearity in the variables that were selected. The coefficient (β_1) was expected to be negative, implying that exchange rate volatility negatively influences the growth size of oil marketing firms.

Model specification for Exchange Rate Volatility on Financial Leverage

$$FL_{\text{it}} = B_0 + B_1 EXCHR_{it} + B_2 NIR_{it} + B_3 LR_{it} + B_4 FD_{it} + \varepsilon_{it} \quad (20)$$

The functional form of the model is specified as:

$$EXCHR_{it} = (ER_{it},) \quad (21)$$

Where,

$$EXCHR_{it} = f(ER_{it}) \quad (22)$$

$$FL_{\text{it}} = B_0 + B_1 ER_{it} + B_2 NIR_{it} + B_3 LR_{it} + B_4 FD_{it} + \varepsilon_{it} \quad (23)$$

Where β_1 through to β_4 are the parameters or the slope of the independent variables. β_0 is the intercept, which implies that if all the other variables are zero, the coefficient β_0 will explain the dependent variable in the equation. Theoretically, the coefficients of β_1, β_2, β_3 and β_4 in equation (23) are expected to be negative. Logarithmic transformation was done on the control variables (NIR, LR and FD) in equation (23) to account for the non-linearity in the variables that were selected. The coefficient (β_1) was expected to be negative, implying that exchange rate volatility detrimental effect on the financial leverage of oil marketing companies in Ghana.

Justification, Measurement of Variables and Sign Expectations

Dependent, intervening and independent variables in this study are chosen based on the objectives of this study, literature, data availability and the significance in the model chosen for the study. Prior expectations of the signs of the independent variables are based on the theoretical literature and the findings from previous studies.

Exchange Rate

Exchange rate is the rate at which a country's currency will be exchange for another country's currency. In the calculation of exchange rates, there are three major issues to consider. The first consideration is whether to use a real or a nominal exchange rate. The difference between a real and a nominal exchange rate can be significant in theory, but statistically, there is little difference between the two since they are highly correlated. The nominal exchange rate was used in this study.

The second problem in the calculation of exchange rate is whether to use direct or indirect quotations. Both are equivalent in economic terms, but the meaning of the exchange rate coefficient is reversed. The meaning of a coefficient, on the other hand, is dependent on how an explanatory variable was calculated. The reason for the different interpretation is that in the case of direct quotation, a rise in exchange rate digits indicates that the foreign currency has appreciated and the local currency has depreciated, and vice versa. This variable is included in the study as a result of its effect on the activities of Oil Marketing Companies in the Ghanaian economy.

Liquidity

Liquidity refers to the amount of money that is readily available to pay bills or invest. It shows how much cash is available and how easily a financial asset or security can be turned into cash without losing a lot of money. Liquidity is significant because it demonstrates a company's ability to fulfill its financial obligations as well as unforeseen expenses. It is also applicable to the average person. Their financial status improves as their liquid assets (cash savings and investment portfolio) outnumber their debts. The liquidity variable is considered as a variable that affect the activities of Oil Marketing Companies because the more volatile the exchange rate then there would be a corresponding easy flow of funds. Liquidity is expected to have a positive effect on exchange rate in the Ghanaian economy.

Firm Size

Firm size is frequently used as a significant, fundamental firm characteristic in empirical corporate finance research. The size of a business unit is the same as the size of a company. It refers to the size or amount of work generated by a single company. Realizing a company's size,' as it affects company and profitability, is one of the most significant entrepreneurial decisions in the organization of a corporation. As exchange rate becomes volatile then firm size begins to shrink or decrease. This indicates a positive relationship between firm size and exchange rate.

Growth Level

When a company grows in size, it is normally measured in terms of revenue, employment, income, or value added. Firm expansion can take the form of sustainable growth or acquisition, and can include duplication or

diversification into emerging businesses (e.g., internationalization). Companies will expand their operations with the help of a growth strategy. Adding new locations, investing in consumer acquisition, or expanding a product line are all ways to grow a company. The business and target market of an organization have an effect on the growth strategies it employs. When there is frequent changes in the exchange rate then the growth of Oil Marketing Companies is expected to be negatively affected.

Financial Leverage

The use of loaned funds (debt) to fund the acquisition of assets is known as financial leverage. Asset-backed lending involves the credit institution using the borrower's properties as collateral before the loan is repaid. In the case of an operating cash loan, the company's overall creditworthiness is used to secure the loan. The use of debt to purchase more assets is known as financial leverage. To maximize the return on equity, leverage is used. Excessive financial leverage, on the other hand, raises the risk of bankruptcy by making debt repayment more complicated. As Oil Marketing Companies obtain more loan facilities then the study expects a positive effect on exchange rate.

Net Interest Rate

Net Interest rate is one indicator of a bank's profitability and growth. It reveals how much the bank is earning in interest on its loans compared to how much it is paying out in interest on deposits. Interest expense is the price the lender charges the borrower in a financing transaction. It is the cost of borrowing money. It is the interest that accumulates on outstanding liabilities. Common examples include customer deposits and wholesale financing.

Interest revenue is generated through interest payments the bank receives on outstanding loans. It is made up of credit lines and loans on the financial institution's balance sheet. Several factors can affect net interest rate especially the demand and supply of money because these factors have an impact on bank interest rates. If there is a greater demand for loans compared to savings, the net interest rate will increase, because the bank pays less interest than it receives. The increase in net interest rate has an impact on the increase in ROA because the profit generated by banks increases. Therefore, net interest rate plays an important role in influencing the increase in ROA.

Lending Rate

Lending rates are the price that a borrower paid when taking loans from the universal banks. These have an impact on the borrower and the lender separately. Literature has shown that high lending rate have implication on both borrower and the lender. On the part of borrower high lending rate scare them because borrowing at a high rate will be difficult for them to settle their obligation. For example, with the current lending rate in the Ghana range of 32%, which implies that, when you borrow at this rate you must invest it and get a return more than 32% either than that you go bankrupt. The bank is also of the view that operation in cost and the cost of providing efficient service is high, for example, with the current situation of electricity crises, where banks have to find another alternative of getting power for their facilities will end up increase their operating cost, in which they have to pass on to the customers in form high lending rate.

Firm Deposit

Similar to a bank fixed deposit, a firm also has a fixed deposit which is analogous to that a financial however this is to a non-banking finance company at a fixed rate of return over a fixed tenure. The rate of interest depends on the maturity of the tenure. It was expected that exchange rate volatility has a negative effect on oil marketing companies' ability to deposit in their financial portfolios.

Table 1: Definition and Measurement of Variables

Variable	Type	Definition and measurement	Expected sign	Source
EXCH	Discrete	The value of one country's currency in relation to another currency		Bank of Ghana
LIQ	Discrete	How much cash is available and how easily a financial asset or security can be turned into cash	+	Annual report
FZ	Discrete	Size or amount of work	-	Annual report
GRWTH	Discrete	Expansion in terms of revenue, employment, income, or value added	-	Annual report
FLV	Discrete	Loaned funds (debt) to fund the acquisition of assets	+	Annual report
NIR	Discrete	Earning in interest on its loans compared to how much it is paying out in interest on deposits.	-	Annual report
LR	Discrete	Price that a borrower paid when taking loans from the universal banks.	-	Annual report
FD	Discrete	Fixed deposit performed by a firm	-	Annual report

Exchange rate is the dependent variable. All other variables are independent variables.

Diagnostic Test

A major methodological issue associated with the analysis of panel data is the possible correlation between the error terms of different periods. This leads to the violation of the assumption of constant variance for the error term that is Var (ε_{it}) δ, known as heteroscedasticity). Therefore, a post-estimation test of this assumption was done to determine the estimates' efficiency. The study conducted a modified Wald test in testing for heteroscedasticity in the fixed effects model and Panel Group wise Heteroscedasticity Tests (for random models). The concentration was not on multicollinearity since panel data has the advantage of containing less multicollinearity (Hsiao, 2007). In order to correct for serial correlation and possible heteroscedasticity, the study run a robust command as part of the panel estimate.

Chapter Summary

This chapter develops and presents the appropriate methodological framework for carrying out this study. Panel data corresponding to two Oil Marketing Companies are employed from 2011 to 2015 for all the variables in this study. Moreover, fixed and random effect estimation methods are used to analyse the effect of exchange rate volatility on Oil Marketing Companies in Ghana. This chapter has set out a good platform for the interpretation of coefficients in the subsequent chapter based on the regression outputs and to prescribe policy recommendations based on the study findings.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

Introduction

This chapter presents the results and discussions of the study. This analysis starts with analysis on the demographic information of respondents and descriptive statistics and then follows with results based on the aforementioned objectives.

Demographic Information

This section offers the background information with regards to the respondents gender, level of education as well as the experience in the oil industry. This was put into consideration because of the meaningful contribution it offers to the study as the variables help to provide the logic behind the responses issued by the respective respondents.

Demographic Analysis

Table 2: Demographic data of respondents

Gender	Frequency	*Percent*
Female	13	*33.0*
Male	27	*67.0*
Total	40	*100.0*
Age		
Under 30 years	25	*63.0*
31 – 40 years	13	*32.0*
41 – 50 years	1	*3.0*
Above 50 years	1	*2.0*
Total	40	*100.0*
Educational Level		
Diploma (HND)	6	*15.0*
Degree	29	*74.0*
Master's Degree	4	*10.0*
Professional	1	*1.0*
Total	40	*100.0*
Number of Working Years		
Less than 5 years	9	*23.0*
5 – 9 years	22	*55.0*
10 – 14 years	8	*21.0*
15 – 19 years	1	*1.0*
Total	40	*100.0*

Source: Field survey (2021)

The most important question was to determine the gender of respondents. This was judged required in order to have a complete picture of the gender makeup of the sampled respondents. A study mainly should clearly show a relative balance of both genders, i.e., male and female participants. In a study, data collected from both male and female respondents is more accurate and appropriate to the public than data collected from simply one gender. Female respondents made up 33% of the sampled respondents in this study, while male respondents made up the remaining 67%. This was a great portrayal of both men and women. Although there were more males respondents than female respondents, the views and opinions of each gender expressed were independent of each other however useful for policy recommendations. Therefore, responses from both sampled gender groups can be extended to all staff of Oil Marketing Companies in Ghana.

The second question in the survey tried to determine the age range of staffs of Total Petroleum and Ghana Oil Company Limited. The age group of the sampled respondents is crucial for the researchers to know. Because people are sometimes self-conscious about their ages, age categories were offered and staffs were asked to choose the most appropriate range. It is obvious from the preceding data that the majority of the staffs in this survey were young people under the age of 30. The bulk of staffs, those under the age of 30, accounted for 63 percent of the staffs' responses, followed by those between the ages of 31 and 40, who accounted for 32 percent. 3 percent of subscriber responses were between the ages of 41 and 50. Finally, only 2% of sampled respondents were beyond the age of 50 years old. These staffs from both Total Petroleum and Ghana Oil Company have a wealth of information regarding the

performance of their respective firms in relation to the exchange rate and are in the greatest position to provide an in-depth analysis of how exchange rate affect indicators like liquidity level, growth level, firm size and leverage level.

Another key demographic variable is the educational background of respondents. It is referred in other circles as academic competence. To fully understand and provide a true analysis and better assessment of the performance of Oil Marketing companies in Ghana, an individual needs to gain some appreciable level of education. As summarized in table 3, majority of the respondents had Degree qualification that constituted 29 (74%) closely followed by Diploma holders who are 6 (15%) respondents. Masters holders were 4 (10%) respondents whiles professional qualification holder was 1 (1%). The least represented group were those with professional qualification. It is clear that each of the respondents had some level of education that is good for this kind of study.

In the area providing an assessment of the performance of Oil Marketing companies, an individual is expected to have witnessed some happenings in the company in which they work as well as the industry in order to get a thorough understanding of how to give an unbiased assessment of the performance of Oil Marketing companies in Ghana. Table 4 revealed that 22 (55%) respondents have worked between 5-9 years, 9 (23%) have worked for less than 5 years followed by 8 (21%) respondents who have gained some experiences in working in both Total Petroleum and Ghana Oil Company Limited for 10-14 years. Only 1 (1%) respondents have experience both Total Petroleum and Ghana Oil company for 15-19 years. This result shows that the respondents have quite fair level of working experience with an Oil marketing

company in Ghana hence adequate information to know how exchange rate some effect on oil marketing companies' performance.

Effect of Exchange rate volatility on Sustainability of OMCs in Ghana

Sustainability of OMCs in Ghana is highly affected by the volatile nature of exchange rate in Ghana. The primary objectives of the study was to examine the effect of exchange rate volatility on sustainability measures (liquidity, growth, firm size and financial leverage level) of two dominant Oil Marketing Companies in Ghana. In meeting the stated objective, respondents were asked to choose assessing how exchange rate volatility affected various sustainability measures of OMCs in Ghana. In meeting the stated objective, employees were asked to either strongly agree, agree, neutral, disagree or strongly disagree with the effects of exchange rate volatility on liquidity, growth, firm size and financial leverage of OMCs in Ghana.

Table 3: Effect of Exchange rate on OMCs sustainability

Effect of Exchange rate on OMCs sustainability	N	Min.	Max.	Mean	Std.
Exchange rate has effect on the liquidity of OMCs	40	1	5	5.73	1.089
Exchange rate has effect on the financial leverage of OMCs	40	1	5	4.40	1.366
Exchange rate has effect on the growth of OMCs	40	1	5	3.83	1.116
Exchange rate has effect on the firm size of OMCs	40	1	5	3.53	1.370

Source: Field survey (2021)

With the use of a five-point Likert scale, with one as "strongly disagree" and five as "strongly agree", respondents rated 4 possible effects of exchange rate volatility on sustainable indicators of OMCs in Ghana. A

higher mean score for a statement indicates greater effect of exchange rate volatility in affecting sustainability measure of OMCs. From table 5, sampled employees from both Total Petroleum and Ghana Oil Company strongly agreed that exchange rate volatility affects the liquidity level of OMCs in Ghana. The mean and standard deviation for this sustainable indicator is 5.73 and 1.089 respectively. The implication is that there is high variability on how exchange rate affects the liquidity level of both Total Petroleum and Ghana Oil Company Limited. This is closely followed by exchange rate that has effect on the financial leverage of OMCs in Ghana. Based on the field survey, the mean value for financial leverage is 4.40 and a standard deviation of 1.366. The effect of exchange rate volatility on OMCs growth was considered the third ranked item. At the end of the year, OMCs are expected to growth in many areas of their operations. However, exchange rate volatility affects the growth capacity of many OMCs including Total Petroleum and Ghana Oil Company Limited. Consequently, the mean and standard deviation from the field survey indicated 3.83 and 1.116 respectively. The implication is that among the four sustainability indicators considered in this study, respondents strongly agreed that the effect of exchange rate volatility on OMCs growth was not as high as its effect on their liquidity and financial leverage. The least effect was recorded in terms of firm size. From table 5, the effect of exchange rate volatility on firm size recorded a mean value of 3.53 and 1.370. This result indicates two implications. First, this result suggests that among the four sustainable indicators of OMCs operations, exchange rate volatility has the least effect on OMCs size as agreed on by all sampled respondents. In a similar breath, the result indicated that there is less variability among OMCs

size due to exchange rate volatility compared to liquidity levels, financial leverage and growth levels

Analysis Based on Annual Data

Prior examination of any dataset is very important before conducting regression analysis. This is done so that there will be a proper feel of the dataset to know the kind of information that the dataset carries. Summary statistics provides us with a number of characteristics of our datasets. These are: a measure of central tendency (mean), a measure of dispersion (standard deviation), the minimum and maximum values. The results of the summary statistics is given in Table 4.

Table 4: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Liquidity	50	3.6	5.595	.78	14.69
Growth	50	.064	.419	-1.08	.36
Firm Size	50	.699	.132	.6	.9
Financial Leverage	50	.716	.046	.67	.82
Exchange rate	50	.15	.02	.12	.19
Net Interest rate	50	18.501	4.113	14.483	24.157
Lending rate	50	26.959	1.05	25.528	28.623
Deposit	50	26661.784	10923.869	11899.87	40322.13

Note: Obs represents observation, Min. represents minimum, Max. represents maximum, Sd. Represents standard deviation

Source: Field survey (2021)

From Table 4, on the average Total and GOIL Marketing Company had a liquidity level of 3.6 with a standard deviation of 5.595. The maximum and the minimum values were 14.69 and 0.78 respectively. For Growth rate, Total and Goil Marketing Company, their mean value is 0.64 with a maximum value of 0.36 and a minimum value of -1.08. This suggest that there are a lot

of variability in both the liquidity level and growth levels of Total and Goil Marketing Companies.

In the case of firm size, on average oil Marketing Company had a growth in size by 0.699 with a maximum size of 0.9 and a minimum firm size of 0.6. In the same vein, the financial leverage of the Oil Marketing Company averagely has a value of 0.716 with a maximum value of 0.82 and a minimum value of 0.67. Exchange rate which is the main policy variable in this study has a mean value of 0.15 with a corresponding spread of values (standard deviation) of 0.02 with a maximum value of 0.19 and minimum value of 0.12. In the same vein, net interest rate, lending rate, deposit levels among Oil Marketing Companies in Ghana have less variability (differences).

Correlation Analysis

Table 5: Correlation Table

Variables	Liquidity	Growth	Size	Leverage	Exchange R.	Interest R.	Lend. Rate	Dep.
Liquidity	1.000							
Growth	-0.649	1.000						
Size	0.763	-0.442	1.000					
Leverage	0.384	-0.527	0.301	1.000				
Exchange R.	0.125	-0.353	0.286	0.753	1.000			
Interest R	0.153	-0.392	0.365	0.541	0.851	1.000		
Lending	-0.082	-0.162	-0.032	0.322	0.658	0.792	1.000	
Deposit	0.213	-0.382	0.417	0.576	0.853	0.966	0.642	1.000

Source: Field survey (2021)

The table 5 showed the correlations analysis of the study, the result recorded positive correlation coefficients between the dependent variables (liquidity, firm size, financial leverage) and key independent variable (exchange rate). The implication is that there is a positive relationship between exchange rate and three other dependent variables (liquidity, firm size and financial leverage). In this case, the correlation coefficient recorded were

0.125, 0.286 and 0.753. Intuitively, when there is a depreciation of the Ghana cedis compared to the US dollar, the liquidity level, firm size and financial capacity of Oil Marketing firms begin to witness a downward trend and vice versa. On the contrary, the result also indicated a negative relationship between exchange rate and growth level of Oil Marketing Companies in Ghana. Specifically, the correlation coefficient recorded was -0.353 indicating an inverse relationship between exchange rate and growth level of Oil marketing Companies in Ghana. The implication is that when exchange rate increase then the Oil Marketing Companies in Ghana begin to witness a shrink in their growth level.

Effects of Exchange Rate Volatility on Liquidity

The results in table 6 show the relationship between exchange rate volatility on liquidity level of GOIL and Total Petroleum

Table 6: Exchange rate volatility on liquidity

Liquidity	Fixed effect	Random effect
Exchange Rate	-0.154 ***	-0.154 ***
	(0.0258693)	(0.0242149)
Net Interest Rate	0.00789	0.00874
	(0.0079282)	(0.0075331)
Lending Rate	0.0000326	0.0000372
	(0.0002258)	(0.0002207)
Firm deposit	-0.00578 ***	-0.00575 ***
	(0.0010036)	(0.0009778)
Constant	19.00 ***	19.12 ***
	(0.5843166)	(0.5467874)
Obs	50	
Hausman (x^2)	0.9335	
Prob>chi2	0.000	

Standard errors in parentheses * p < 0.1, ** p < 0.05, *** p < 0.01

Source: Field survey (2021)

Table 6 indicated the effect of exchange on the liquidity level of oil marketing companies in Ghana especially GOIL and Total petroleum. Using

the fixed effect, exchange rate had a negative significant effect on the liquidity level of oil marketing firm in Ghana. At a 1 % significance level, when exchange rate increases by $1 then liquidity level reduces by 0.154 units. The implication of this result is that the unstable movement of exchange rate dominated by increases in exchange rate, thus dollar to cedis has a detrimental effect on the quantity of money at hand for oil marketing companies in Ghana. This conclusion is inconsistent with the findings of Haung and Stoll (2011) that events of exchange rate turbulence had little or no effect on the trading costs of firms in the United States. Their results suggest that the impact of exchange rate volatility on market liquidity is not a conduit by which stock values are affected. In an analogous study, Hanh (2018), there was evidence of a significant relationship between liquidity and real exchange rate volatility, which is, however, diverse and strongly depends on the way to measure liquidity level.

Similarly, at a 1% significance level, firm deposit has a negative significant effect on the liquidity level of the two oil marketing firms in Ghana. This implied that when firm deposit increased by Gh 1 then the liquidity level of the two oil marketing companies decreased by 1 unit. This intuitively implied that when oil marketing companies increased their level of financial deposits with financial institutions then there is little space for oil marketing firms to keep physical cash for operations. Akenga (2015) indicated that listed companies on the Nairobi Stock Exchange have considerable fund deposits therefore they have little cash to work with within the financial sector.

With regard to the random effect estimation results, at a 1% significance level, exchange rate changes had a negative significant effect on the liquidity level of the two oil marketing company in Ghana. When exchange rate changed with by $1, it resulted in the liquidity level reducing by 0.154 units in their liquidity levels. This implied that the frequent changes in the exchange rate has an inverse impact on the cash available for oil marketing companies in Ghana. In the same vein, firm deposit has a negative effect on the liquidity level of oil marketing companies in Ghana. With the 1% significance level, when the oil marketing companies increased their deposit level by 1 unit, the liquidity level decreased by 0.00575 units. The intuition was that firm deposits decreased the space for the oil marketing company to have space for handling cash for further operations. It can thus, be concluded that both exchange rate changes and firm deposits had a negative influence on the liquidity level of both GOIL and Total Petroleum Company, that is to say that it contributes to stifling the capacity of oil marketing companies in Ghana to have liquid capital for operations. These findings are however inconsistent with works by Gabaix and Maggiori (2015), Adjasi, Harvey and Agyapong (2008) who discovered a positive by a significant relationship between exchange rate volatility and liquidity as well as between firm deposit on the firm's liquidity level.

Effect of Exchange Rate Volatility on Firm Size

Based on objective 2, this study also analysed the effect of exchange rate volatility on OMCs size as shown in table 7.

Table 7: effect of exchange rate volatility on firm size

Firm Size	Fixed effect	Random effect
Exchange Rate	-0.193 ***	-0.189 ***
	(0.0249308)	(0.024885)

Net Interest Rate	0.000506 **	0.000527 **
	(0.0002148)	(0.000215)
Lending Rate	-0.0110**	- 0.0418***
	(0.0038)	(0.0139)
Firm Deposit	0.0108**	-0.0019
	(0.0038)	(0.0198)
Constants	0.4665	-0.0872
	(0.3631)	(0.2493)
Obs	50	
Hausman (x^2)	0.73	
Prob>chi2	0.000	

Standard errors in parentheses $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$
Source: Field survey (2021)

From table 7, there was a negative and significant relationship between exchange rate and the firm size of OMCs in Ghana with a coefficient of -0.193 at a 1% significance level. This means that when exchange rate becomes volatile then OMCs' finances are affected for them to expand their existing size for further production purposes. When interest rate increases by 1%, OMCs size increase by 0.000506 at a 1% significance level. The implication is that by increasing the interest rate by an additional rate, OMCs size also enhanced by 0.000506 thus indicating the OMCs preference for interest bearing ventures has the capacity to expand their firm's size rather than investing in the marketing of oil products. In concordance with this findings, Tunc and Solakoglu (2017) discovered that exchange rate could only affect a firm based on its size.

On the contrary, there is a negative and significant relationship between lending rate and OMCs firm size at a 1% significance level. When lending rate increased by 1% it led to a 0.0110 reduction in OMCs firm size. This suggested that when financial institutions increased their lending rate by 1% the corresponding consequences was that there was a shrink in the size of the two OMCs in this study. This conclusion aligns with the findings of Baah-

Acquah, Freeman and Ellis (2017) that exchange rate volatility has varying and mixed relationships with firm' size. In the case of firm deposit, there was a positive relationship between firm deposit and firm size among OMCs in Ghana. Specifically, at a 5% significance level, firm size had a 0.0108 increase when firm deposit increased by an additional deposit.

From the perspective of the random effect results, exchange rate and lending rate had negative and significant relationship on each count with firm size. On the contrary, net interest rate had a positive and significant effect with firm size. In the case of exchange rate, when the rate increase by $1 then the OMCs size decreased by 0.189. Intuitively, exchange rate volatility has a detrimental effect on OMCs size thereby stifling the possibility of OMCs enlarging in terms of size. Similarly, when the lending rate was increased by %1 then OMC's size decreased by 0.0418. Therefore, lending rate has a cascading effect on OMCs firm size. In this sense, Van Tien, Hiep, Bao and Van Hanh (2022) corroborated in their study that the rate at which firms borrow from financial institutions when high will eventually result in shrinking of the firms' size. However, net interest rate had a positive value of 0.000527 thus a %1 increase in interest rate also produced an additional increase in OMCs size. In this case, OMCs preferred investing in financial products rather than investing in the marketing of oil products.

Effect of Exchange Rate Volatility on Firm Growth Level

In reference to objective 3, the study was interested in analysing the effect of exchange rate volatility on the growth level of OMCs in Ghana.

Table 8: Exchange rate volatility on firm growth

Firm Growth	Fixed effect	Random effect
Exchange rate	-0.0291	-0.0362***

	(0.0210)	(0.0135)
Net Interest rate	0.0395*	0.0423**
	(0.0191)	(0.0170)
Lending rate	0.0329	0.0034
	(0.1143)	(0.1110)
Firm Deposit	-0.0137	-0.0130
	(0.0116)	(0.0115)
Constants	0.1343	-0.2067
	(0.4320)	(0.2902)
Obs.	50	
Hausman (x^2)	121.58	
Prob>chi2	0.000	

Standard errors in parentheses $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$
Source: Field survey (2021)

Table 8 revealed that net interest rate had a positive and significant relationship with OMCs growth. At a 10 % significance level, when net interest rate increased by %1, there was a corresponding 0.0395 increase in OMCs growth rate. This can be explained from the perspective that the increase in interest rate is to dissuade other groups and entities in acquiring loan facilities such that the rate benefitted OMCs in their operations as they have the capacity to repay the loan back culminating in growth among OMCs in Ghana. In a contrary finding, Eger (2014) indicated that oil companies in Kenya that pay higher interest rate for acquired loans mostly experience slow growth compared to other contemporary companies.

In the same table 8, exchange rate and net interest rate had significant effects on the growth level of the two OMCs in Ghana. The former had a negative relationship between exchange rate and OMC growth level at a 1% significance level. In a reverse instance, net interest rate had a positive significant relationship with growth level of the two OMCs in Ghana. For exchange rate, when there was a $1 increased in the dollar rate, OMCs witnesses their growth level reduced by 0.0362 at a 1% significance level. The

implication was that anytime there was an upward adjustment in the exchange rate there a contrary resulting effect on the growth level of the two OMCs in Ghana. Net interest rate in relation produced a value of 0.0423 where an increase in interest by 1% resulted in the growth level of OMCs enhanced by 0.0423. This meant that the increase in interest rates had some indirect benefit of enhancing the growth level of the two OMCs in Ghana.

Effect of Exchange Rate Volatility on the Financial Leverage of OMCs

The last objective of the study looked at the effect of exchange rate volatility on the financial leverage of the two OMCs in Ghana. In this regard, financial leverage was considered as the dependent variable whiles exchange rate, net interest rate, lending rate and firm deposit were the included independent variables to run the analysis.

Table 9: Exchange rate volatility on financial leverage

Liquidity	Fixed effect	Random effect
Exchange Rate	-0.0137*	-0.0221***
	(0.0061)	(0.0079)
Net Interest Rate	0. 1333 ***	0.0759
	(0. 0264)	(0.0512)
Lending Rate	-0.0124*	-0.0193***
	(0.0052)	(0.0058)
Firm deposit	0. 3822	0.1451**
	(0. 2029)	(0.0634)
Constant	0.3835*	0.0852
	(0. 1571)	(0.3676)
Obs	50	
Hausman (x^2)	3.02	
Prob>chi2	0.8066	

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Field survey (2021)

As shown in table 9, it was discovered that exchange rate volatility has a negative significant relationship with the financial leverage of the two OMCs in Ghana. It was identified that at a 10% significant level, when exchange rate increased by $1 there was a consequential reduction in 0.0137

in the financial leverage of the two OMCs in Ghana. This implied that the reoccurring volatile nature of exchange rate, it was not prudent to the two OMCs to used borrowed money as it came back with less value than the money invested into financial instruments. Panda, Nanda, Singh and Kumar (2018) also came out with similar findings where exchange rate volatility has a spillover effect on the financial return of firms in some emerging economies. Such instability has caused sometimes less than the expected return or no return due to the detrimental effect on a volatile exchange rate.

Estimation on net interest rate also revealed that there was a positive significant relationship with the financial leverage of the two OMCs in Ghana. In light of this, a 1% increase in the net interest rate of the money investment by the two OMCs in Ghana then there was a 0. 1333 increase in the financial leverage of the two OMCs in Ghana. OMCs are found of investing some of their capital in financial instruments hence it was more rewarding for the OMCs to investment some borrowed into interest bearing instruments. In the case of lending rate, at a 10% significance level, when lending rate increased by 1% it led to a 0.0124 reduction in the financial leverage level of the two OMCs in Ghana. Lending rate amidst an unstable exchange rate rendered OMCs financial leverage less effective. The aforementioned finding was in tune with the conclusion of Barakat (2014) indicating that interest rate pegged at a higher rate has the tendency to demotivate firms in accruing funds from other financial institutions to expand their operations.

In the case where the researcher adopted the random effect estimation method, exchange rate had a negative significant effect on the financial leverage of the two OMCs in Ghana. For exchange rate, at a 1 % significance

level, when exchange rate increased by $1 there was a resulting 0.0221 reduction in the financial leverage. This implied that anytime exchange rate experienced an upward trend, financial leverage of the two OMCs suffer a downwards trend. Lending rate has a significant negative effect on the OMCs financial leverage in Ghana. It was recorded that when lending rate increased by 1%, the financial leverage of the two OMCs fell by 0.0193. This implied that when the rate at which OMCs get extra funds increased, the returns from the borrowed reduced as expected. The firm deposit has a significant positive effect on the financial leverage of the two OMCs in Ghana. Specifically, when the two OMCs increased their deposit level by an extra cedis, the financial leverage increased by 0.1451. This was expected as when OMCs put some funds down for investment then the expectation was that any borrowed money was to give extra boost to the operations of OMCs in Ghana.

Chapter Summary

This study aims at the effect of exchange rate volatility on Oil Marketing Companies in Ghana. The study specifically examined the effect of exchange rate volatility on liquidity, growth, size and the financial leverage of OMCs in Ghana using Total Petroleum and Ghana Oil Company as case study. Based on both fixed and random effects estimation methods, the chapter has presented the results and given all the needed discussions and interpretations that suit the findings of the study. The next chapter presents the concluding part of the study.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

A summary of the study is presented in this chapter. In addition, this chapter present conclusions and policy recommendations based on the study's results, as well as and suggesting areas for future research on the subject.

Summary

As a core objective, the study sought to examine the effect of exchange rate volatility on the sustainability of Oil Marketing Companies in Ghana. Specifically, the study sought to estimate the differential effects of exchange rate volatility on the liquidity, growth level, firm size and financial leverage of Oil Marketing Companies in Ghana. The study employed the fixed and random effect estimation method to analyse the differential effects of exchange rate volatility on the liquidity, growth level, firm size and financial leverage of OMCs in Ghana. In addition to the aforementioned variables, the study also considered other macroeconomic variables like the net interest rate, lending rate, deposit rate and non-performing loan among financial institutions in Ghana.

The study found out that exchange rate volatility has a significant negative effect on the liquidity of OMCs in Ghana. When the rate at which the domestic currency is unstable compared to other foreign currencies especially the US dollar, OMCs are constrained in their ability to convert their assets into physical cash. This stems from the fact that when the exchange rate is highly volatile OMCs are hesitant to convert their existing assets into cash as they are afraid to loose them to exchanging more of the domestic currency to foreign

currency. Moreover, the level at which OMCs deposit their funds with financial institutions also stifled the financial space for the holding physical cash for further operations. In the marketing of oil products, OMCs need a lot of physical cash into to meet urgent demands which sometimes occur in the oil market hence the need to have enough physical cash to buy and sell more oil to their various outlets.

Exchange rate volatility was also found out to have an inverse effect on the growth of OMCs in Ghana. An unstable exchange rate regime will affect the rate at which OMCs expand to other grey areas in Ghana. Most of the OMCs in Ghana rely on foreign currencies for their daily activities due to the high import of oil from other countries. Hence, when players in the oil industry have to secure more domestic currency for foreign as well as witness a volatile regime then it will be difficult for OMCs to undertake future planning activities for firm-specific growth. Similarly, lending rate had a cascading effect on OMCs size thus reducing the capacity of OMCs to enlarge their size. On the contrary, net interest rate contributed to OMCs enhancing their firm size.

In the case of firm growth, exchange rate volatility exhibited a significant negative effect on firm growth. This is in line with intuition that a volatile exchange rate has an adverse effect on the level to which OMCs in Ghana can grow. This is explained by the idea that OMCs in Ghana have to change more domestic currency for foreign currency mostly dollar such that OMCs do not have the financial muscle to reinvest in their operations to grow their customer base. However, net interest rate in relation to firm growth level produced a positive effect. This is contrary to the known idea. This could be

explained as when OMCs invest in financial market products such that the returns are used to expand the customer based on the two OMCs hence growth is achieved.

In the case of financial leverage, exchange rate volatility has a significant negative effect on the financial leverage of OMCs in Ghana. This meant in the case where there is an unstable exchange rate, OMCs return on their borrowed money yielded less return in comparison to foreign currencies. Lending rate on the other hand has a significant negative effect indicating that a high lending rate serve as a cap on the financial leverage of OMCs in Ghana. OMCs cannot get a lot of borrowed money due to the rising lending rate that financial institutions charge prior to giving out funds to OMCs for more oil expansion activities. On the contrary, firm deposit had a significant positive effect on the financial leverage of the two OMCs in Ghana. This was to ensure that OMCs in depositing their funds then they are in better to get better returns for their funds.

Conclusion

The study concluded that exchange rate volatility at each point reduced the liquidity level, firm size, growth level and the financial leverage of OMCs in Ghana. This meant that an unstable exchange rate rendered all the considered indicators of oil marketing companies worse off as they will fail to compete with other foreign oil marketing firms in a volatile exchange rate regime in Ghana as their oil prices becomes highly uncompetitive.

Recommendations of the Study

Drawing from the findings and conclusions of this study, the following recommendations are suggested:

The Bank of Ghana should adopt a fixed exchange rate regime in order to help protect domestic Oil Marketing Companies in Ghana. In the world, the US dollar is the most traded currency hence the Bank of Ghana can tie the Ghanaian cedis to the US dollars in order to keep the Ghanaian cedis within a narrow band to help domestic OMCs to remain competitive in the Ghanaian economy.

Managers of Oil Marketing Companies should pay much attention and keep themselves abreast with happenings on the forex market on exchange rate movements to guide their business activities. This is confirmed by the descriptive statistics with majority of the managers to agree that exchange rate volatility affects the OMCs performance in terms of liquidity, growth, firm size and financial leverage.

Managers of the OMCs should hedge the prices of the product in the international market in that they pay a specific exchange rate irrespective of the volatility of exchange rates. However, the risk of this strategy in the company will be at a disadvantage if there is a significant decline in exchange rate because the hedging company will have required them to pay at a specific rate.

Suggestions for future research

While it is important to examine the effect of exchange rate volatility on sustainability indicators of Oil Marketing Companies in Ghana. Additional research on forex fluctuations in Ghana and how they have impacted the oil market should be performed, according to the researcher, in order to determine the recent exits of global firms and the growth of local and regional companies.

Further research can be carried out to see if there is a link between a company's net worth and the measures used to reduce foreign exchange volatility. The study also suggests that a study be conducted to determine the effects of foreign exchange volatility on the financial performance of companies other than the oil marketing industry.

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APPENDICES

APPENDIX I

QUESTIONNAIRE

1) Gender

   Female ( ) Male ( )

2) Please indicates your level of education

   Diploma ( )

   Bachelor ( )

   Masters ( )

   Doctorate

   Others (Please specify)……

3) How long have you been working in the Oil industry?

   Less than 2 years ( )

   3-5 years ( )

   6-9 years ( )

   10 years and above ( )

   Others……..

4) To what extent does the volatile exchange rate affect the sustainability of Oil Marketing Companies in Ghana using liquidity, growth, size and financial leverage as a measure.

Using a scale of 1= Strongly Agree (SA) 2= Agree (A) 3= Neutral (N) 4= Disagree (D) 5= Strongly Disagree (SD)

	SA	A	N	D	SD
Exchange rate volatility affect the liquidity of OMCs					
Exchange rate volatility affect the growth of OMCs					
Exchange rate volatility affect the size of OMCs					
Exchange rate volatility affect the financial leverage					

Reasons (If Any)

……

……

……

……

……

……

……..

Appendix II

Heteroscedasticity

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of FLV

         chi2(1)      =     0.68
         Prob > chi2  =   0.4097
```

Omitted Variable

```
Ramsey RESET test using powers of the fitted values of FLV
      Ho:  model has no omitted variables
                  F(1, 3) =      4.30
                  Prob > F =     0.1299
```

Multicollinearity

Variable	VIF	1/VIF
NIR	73.77	0.013556
PD	44.78	0.022332
LENR	13.56	0.073749
EXCH	4.00	0.250000
NPL	2.65	0.377410
Mean VIF	27.75	