

UNIVERSITY OF CAPE COAST

EFFECT OF PETROLEUM PRICE ON STOCK MARKET RETURNS IN
GHANA

BY

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DECLARATION

Candidate's Declaration

I hereby declare that this dissertation 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

Edward Andoh

Supervisors' Declaration

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

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Co-Supervisor's Signature Date

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ABSTRACT

This study investigated the effect of petroleum price on stock market returns in Ghana by using monthly data from 1990 to 2017. The study also examined the causality among macroeconomic variables as well as the moderating effect of financial crises and Ghana's lower middle income status on stock market returns. The study adopted the Autoregressive Distributed Lag (ARDL) model and the Linear Regression Model to achieve the objectives of the study. The findings were that there is both short run and long run relationships among the independent variables and stock market returns; with a speed of adjustment towards long run equilibrium of 2%. This means that it will take 50 months for the short run deviations in the market to converge towards long run equilibrium. It was observed that 2007/2008 financial crises did affect the changes in stock returns of Ghana but does not moderate the relationship between petroleum price and stock returns. The study recommended that the government should use petroleum subsidies to lower the petroleum price levels in the domestic market in Ghana since petroleum price negatively affect stock market returns. The government is also encouraged to strengthen the capital market so that it can withstand future financial crises; but at the same time should put in place policies that will move Ghana to higher income status levels.

KEY WORDS

Autoregressive distributed lag model

Financial crises

Foreign direct investment

Import duty

Income status

Petroleum price

Regression

Stock returns

Taxes

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DEDICATION

To Miss Amanda Mensah

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LIST OF ACRONYMS

APT	Arbitrage Pricing Theory
ARDL	Autoregressive Distributed Lag
ASI	All Share Index
CAPM	Capital Asset Pricing Model
CPI	Consumer Price Index
ECM	Error Correction Model
GNP	Gross National Product
GNPC	Ghana National Petroleum Corporation
GNPPC	Gross National Product Per Capita
GSE	Ghana Stock Exchange
LPG	Liquidified Petroleum Gas
OLS	Ordinary Least Squares
PIAC	Public Interest and Accountability Committee
VECM	Vector Error Correction Model
WDI	World Development Indicators

CHAPTER ONE

INTRODUCTION

The behaviour of petroleum prices has received much attention in recent years because it is thought that petroleum price can have diverse effect on energy costs, global economic growth, public finances, financial markets and growth for both net petroleum exporting and net importing countries among others (Barnor, 2014). It has been observed by Adjasi (2009) that the Ghanaian economy largely depends on petroleum products in daily economic activities. Petroleum products have numerous uses which include uses in transportation, power generation, road construction and it is used as inputs in manufacturing industries among others.

In Ghana, increases in the world price of petroleum commodity are transmitted into the domestic economy through increases in the domestic prices of petroleum products such as diesel fuel, petrol (gasoline), jet fuel, kerosene, liquidified petroleum gas (LPG) and natural gas (NG). As a major source of input for the productive sectors of the economy, petroleum price increases could have serious repercussions on the country's economic fundamentals.

According to Lin, Presley, and Appiah (2014), in Ghana, petroleum products have played a pivotal role in the nation's economic activities. Since the discovery of Ghana's oil in commercial quantities in 2010, the national budget is often built annually around the oil production and revenue. Petroleum exploration in the country is also expected to boost the purchasing power of the economy, promote

industrial growth and investment, boost the earnings and cash flows of corporate firms, boost dividend payment to investors, and consequently increase stock prices. This means that petroleum price could have an impact on the returns of the stock market in Ghana. This study therefore, seeks to investigate whether or not petroleum price affect the stock market returns in Ghana.

Background to the Study

Volatility is an innate feature of petroleum price in the broad-spectrum due to its far-reaching use as input in the production process and as a final consumption good (Swanepoel, 2006; Goodness, 2015). Accordingly, petroleum price may wield immense influence on the worldwide economy. The volatile nature of petroleum price has raised concern by policy makers, international institutions, and investors about the possibility of injurious impact on the various sectors of the economy.

As a result of the overriding significance of petroleum commodities to the world economies and for that matter Ghana, many researchers (Narayan & Narayan, 2010; Adjasi, 2009) have had the interest in investigating into the area of petroleum price. Although a number of studies have been conducted linking crude oil price to real economic activities such as consumption, investment, and growth, the keen concern for the exact impact of petroleum prices on stock market returns have received no considerable attention. Also, developments such as the 2007-2008 global financial crises, Ghana's lower middle income status attainment, and the nation's oil exploration since 2010 have also finely turned attention of researchers to conducting investigations into the investment environment of Ghana. Thus, financial crises

could exert negative influence on stock returns through international commodity price movement such as petroleum price (Floro, 2011). Similarly, Aaron (2016) reported that the income status of a country can drive the investment environment. Thus, the lower middle income status of Ghana could have implication for stock market returns.

Ghana earned \$3.208 billion from petroleum revenue for the production of 161.7 million barrels of crude oil between 2011 and 2015 (PIAC, 2016). Although the highest number of barrels, 37.4 million, was recorded in 2015, Ghana received the lowest revenue of \$396,171,909 in that year and it was as a result of the fall in the international market price of oil. According to the Public Interest and Accountability Committee (2016), petroleum prices fell by as much as 35 per cent on the international market in 2015.

Most Ghanaian firms listed on the Ghana Stock Exchange, especially the manufacturing firms and banks rely heavily on petroleum products for production and operation. Mahotra (2015) reported that Banks are affected by petroleum price dynamics. He argued that high petroleum price may result in high production cost for manufacturing firms which could translate into losses. Such losses by manufacturing firms could lead to credit default and that will affect the returns of banks. It is therefore expected that petroleum prices could have effect on both bank and non-bank firms.

To further understand the dynamic effect of petroleum price on the stock market, Aaron (2016) posited that an economy's income level significantly affect the level of stock returns. Following this findings, it could be expected that Ghana's

attainment of a lower middle income status in 2010 could have effect on the stock market returns.

As Goodness (2015) put it, theoretically, asset prices should be determined by their expected discounted cash flows. It is therefore, expected that factors such as petroleum prices that can alter the expected discounted cash flows are expected to have a significant effect on asset prices. In view of that, petroleum price increase would result to enlarged costs, limited profits and to a greater extent, cause a decrease in shareholders' wealth. Hence, any increase in petroleum price should be accompanied by a decrease in the stock prices and consequently stock returns (Filis, Degiannakis, & Floro, 2011). This means that petroleum prices could have a relationship with stock returns. Thus, in the short run, increase in petroleum price may increase input prices while in the long run, the returns of firms could be reduced. The question that stands for investigation is, does short run and long run relationship exist between petroleum price and stock market returns in Ghana?

Figures 1 and 2 depict the trends in petroleum prices and stock returns of Ghana Stock Market from 1990 to 2017. The figures clearly show that the volatilities in stock returns are larger than the volatilities in petroleum prices. Figure 1 also reflects that petroleum prices have consistently increased from the periods of 2000 to 2008 where it reached the highest level. Interestingly, as petroleum prices reached the all time highest level in 2008, the stock returns also reached its all time lowest point in the same year. It was during this same period that the global financial crises reached its peak. From the above observation, one may conjecture that petroleum price, stock returns and the 2007/2008 global financial crises are all connected. The

study therefore, sought to investigated whether the financial crises of 2007/2008 moderates the relationship between stock returns and petroleum prices.

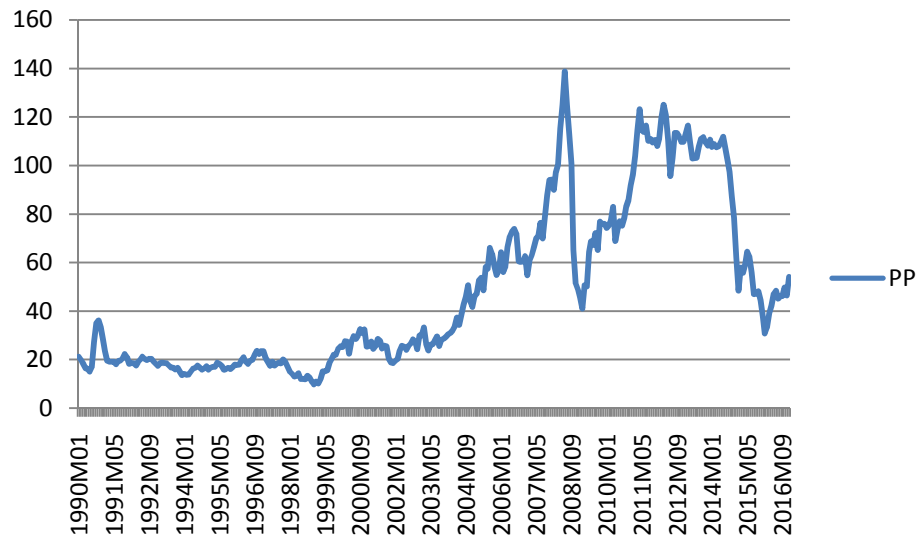


Figure 1: Trend analysis of petroleum price (PP)

Source: Field Survey, Andoh (2019)

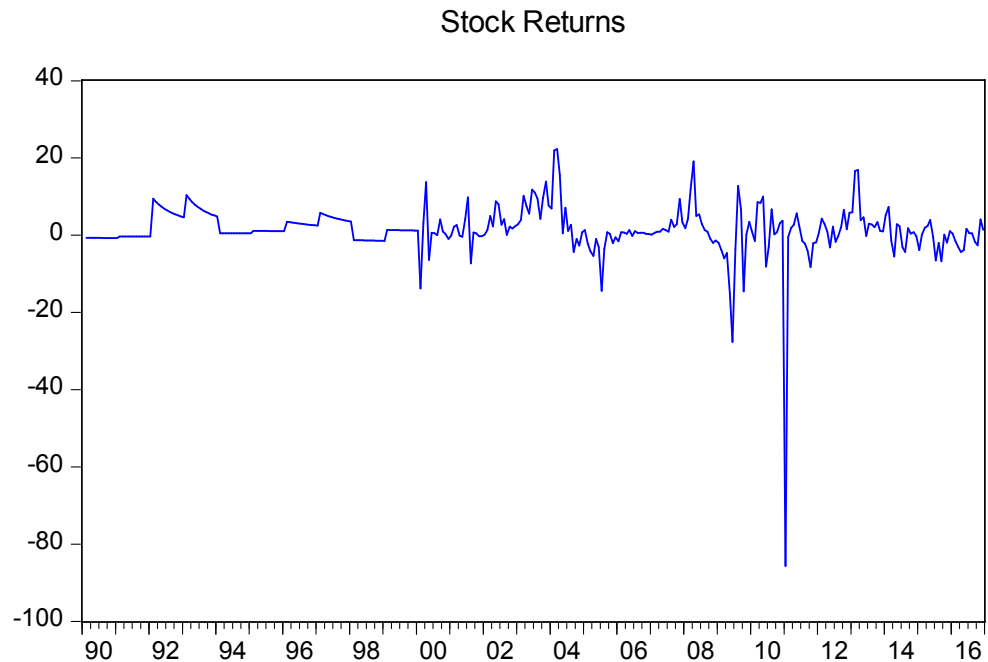


Figure 2: Returns of Ghana Stock Market

Source: Field Survey, Andoh (2019)

Statement of the Problem

The stock market of Ghana is dominated by mining firms, manufacturing firms and financial institutions. According to the Ghana Stock Exchange Annual Report (2016), mining and manufacturing firms constitute the second largest companies listed on the Ghana Stock Exchange. These firms are ranked first in terms of market capitalisation despite the fact that banking firms dominate in terms of numbers. These firms largely depend on petroleum products as inputs for their operation. As a result, increase in petroleum prices is expected to raise the production cost which in turn reduces the profit margins and consequently the dividend payouts. Low dividends could put downward pressure on the shares of these firms hence the possibility to dwindle the demand for their shares. Low demand for shares will result in low share prices and low returns, holding all else constant. This means that petroleum prices could have a relationship with stock returns. Thus, in the short run, increase in petroleum price may increase input prices while in the long run, the returns of firms could be reduced. The question that stands for investigation is, does short run and long run relationship exist between petroleum price and stock market returns in Ghana?

Amidst the forgoing trend, recent development in Ghana including the attainment of lower middle income status as well as the global financial crises is thought of as having the propensity of affecting the stock market. The reasoning here is that financial crises is a global phenomenon while petroleum price is also

determined on the international market. Thus, external shocks such as the financial crises could directly reduce investment on the stock market as a result of loss to investors; petroleum price hikes could also increase the input prices of firms and reduce the returns of firms. Similarly, the lower middle income status of Ghana may also direct investment onto the stock market since higher incomes reflects profitable investment opportunities in the country. It will be of great interest, therefore, to examine the overall effect of petroleum prices on the returns of Ghana's stock market.

Several studies on the impact of crude oil prices on economic activities have been conducted but these studies are concentrated on economies of the developed world (Duran, Lorenzo & Amenta, 2011; Garcia & Liu, 1999; Hill, 2010; Goodwin, 1985; Hamilton, 1983). Moreso, there are very limited studies on the behaviour of petroleum prices and the stock market in Ghana (Kuwornu, 2011; Muhammad, 2013). Also, no study regarding this area has been conducted in Ghana after the discovery of oil in commercial quantities. The limited studies conducted within the realms of this topic failed to consider some major recent developments in Ghana which theory suggests could affects stock returns. The variables neglected by previous studies are the presence of the global financial crises of 2007-2008 and Ghana's lower middle income status attainment. This study bridges these gaps in literature by investigating the effect of petroleum prices on stock market returns by examining the relationship between petroleum prices and stock market returns. The study situates itself by looking at petroleum price rather than crude oil price because Ghana's productive sector largely depends on petroleum products. Hence, petroleum

prices could closely influence the stock market returns relative to crude oil prices which has been the focus of many studies. This study is also distinguished from previous studies by taking into consideration recent development in Ghana's economic life such as the attainment of lower middle income status in 2010. Lastly, the study accounts for the effect of the global financial crises which occurred in 2007 and lasted until 2008/09 which many previous studies (Duran, Lorenzo & Amenta, 2011; Kuwornu, 2011; Muhammad, 2013) ignored. Thus the study, hypothesis that stock returns in Ghana is influenced by petroleum price, income status and financial crises.

Purpose of the Study

Considering the pivotal relevance of petroleum products to the economy of Ghana and particularly its impact on investment, it would be of a higher interest to investigate whether petroleum prices exert any effect on returns of the stock market. To this extent, the overall purpose of this study, therefore, was to investigate the effect of petroleum prices on Stock Market Returns in Ghana.

Research Objectives

The study sought to achieve the following specific objectives.

1. To examine the short run relationship between petroleum prices and stock market return
2. To examine the long run relationship between petroleum prices and stock market return

3. To investigate whether Ghana's lower middle income Status and 2007/2008 financial crises have any moderating effect on the relationship between petroleum price and returns of the Ghana Stock Exchange

Research Hypotheses

Based on literature and theory, the following null hypotheses and alternative hypotheses will be postulated and against which empirical investigations will be carried out.

Objective 1:

Null hypothesis (H_0): There is no significant short run relationship between petroleum prices and market returns of Ghana Stock Exchange.

Alternative hypothesis (H_1): There is a significant short run relationship between petroleum prices and market returns of Ghana Stock Exchange.

Objective 2:

Null hypothesis (H_0): There is no significant long run relationship between petroleum prices and market returns of Ghana Stock Exchange.

Alternative hypothesis (H_1): There is a significant long run relationship between petroleum prices and market returns of Ghana Stock Exchange.

Objective 3:

Null hypothesis (H_0): Statistically, Ghana's lower middle income Status and the 2007/2008 financial crises have no significant moderating effect on the relationship between petroleum prices and returns of the Ghana Stock Exchange.

Alternative hypothesis (H_1): Statistically, Ghana's lower middle income Status and 2007/2008 financial crises have a significant moderating effect on the relationship between petroleum prices and returns of the Ghana Stock Exchange.

Significance of the Study

The study will have significant implications for the Ghanaian market economy, investors of the stock markets, governments, the business communities, and the research community at large. All these players will be able to draw clues from the diverse findings of the study to make informed decisions and policies.

The results of the study will aid the Ghanaian market economy to have better understanding of how petroleum prices affect the investment environment. Investors will also be able to use the findings of the study to make informed decisions regarding their investments. The government will also benefit from the findings of the research in terms of regulatory and policy directions. Consequently, the research community at large will have its fair share of the benefit since the study will add to the stock of existing literature by providing answers to fill the existing gap.

Delimitations of the Study

The study was conducted in the Ghanaian market economy. To be precise, the study focuses on the domestic petroleum prices and the stock returns of the Ghana Stock Exchange. The study used the Ghana Stock Exchange All Share Index (ASI) and the Composite Index (CI) to obtain the stock returns. Since the study focused on the ASI and the CI for computing the stock returns, it means that the study was restricted to only companies that are listed on the Ghana Stock Exchange. Petroleum price was the main exogenous variable with consumer price index, interest rate, Gross Domestic Product Per Capita (GDPPC), M3 money supply, gross domestic savings, and exchange rate being the control variables. Global financial crises of 2007/2008 and Ghana's lower middle income status dummy variables were used and their effect in respect of stock market returns was examined. The main endogenous variable was the stock market returns.

Limitations of the Study

The study used the average of diesel price and price of petrol to define petroleum price. The study did not consider other prices of petroleum products that are used as inputs by firms. The study is thus limited in this regard. Similarly, the study was limited to firms listed on the Ghana Stock Exchange. This means that the several manufacturing firms whose operations are highly dependent on other petroleum prices were not considered in this study. The results generated from this study are therefore more applicable to listed firms rather than all firms in the Ghanaian economy.

Definition of Terms

The meaning of key terms used in the study is briefly outlined below:

Petroleum price

Petroleum prices according to this study refer to the average of domestic refined petroleum and diesel prices computed from the world petroleum prices.

Stock Market Returns

Stock Market refers to actual profit or loss of the trading in stock prices by all companies listed on the Ghana Stock Exchange. It is also the percentage change in the stock prices from one period to the other.

GSE ASI-CI

GSE ASI-CI refers to the Ghana Stock Exchange All Share Index and Composite Index. It represents the value weighted index for stocks that are listed on the Ghana Stock Exchange. It is also used as proxy for computing the stock market returns.

Global financial crises

This is a major disruption in financial market, characterised by sharp decline in asset prices and the failures of many financial and non financial firms.

Organisation of the Study

The study is made up of five chapters. Chapter one introduced the research study and covered key issues such as background to the study, statement of the problem, purpose of the study, research objectives, significance of the study the delimitations of the study, and how the study has been organised. Chapter two

captured literature review; where other studies within the context of this research was discussed; with the objective of exploring and producing better understanding of the problem under investigation. Chapter three dealt with the research methods; where the data collection procedures and data processing and analysis were discussed. Chapter four focused on the results and the discussion of the findings of this research. The final chapter, chapter five concludes the research by summarizing the thoughts within the pages of this study, the conclusions arising from the research and any possible recommendation which the researcher provided.

Chapter Summary

This chapter introduced the entire study and looked at issues including the background to the study, statement of the problem, research objectives and hypothesis, significant of the study, delimitation and limitations of the study, and finally how the entire study was organised.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter seeks to review relevant literature on the topic to draw attention to important issues within the area of petroleum prices as well as the stock market of Ghana and its returns. The chapter is organised into two key components: theoretical review and empirical review. The literature review highlighted on the petroleum industry of Ghana, Ghana's stock market, the global financial crises of the 2007 and 2008, and Ghana's lower middle income status among others.

Theoretical Review

It is commonly believed that asset and commodity prices as well as economic variables in general have theoretical foundations. This study is therefore underpinned by four fundamental theories namely the catastrophe theory, arbitrage pricing theory, the linear or symmetric relationship theory, and the theory of equity valuation. The various components and thus the investigations done by this study is reinforced and linked up by the aforementioned theories.

The Catastrophe Theory

Sometimes in an economy a system becomes prone to even a small external change, which can give a disproportionately strong response. Catastrophe theory allows us to define critical values of pressure upon the system at which a crisis becomes inevitable. Analysis of the quantitative characteristics gives us the chance

to draw the qualitative outputs necessary for making management decisions, both at micro and macro levels, depending on the scales of the analyzed system.

Catastrophe theory originated with the work of the French mathematician René Thom in the 1960s, and became very popular due to the efforts of Christopher Zeeman in the 1970s. It considers the special case where the long-run stable equilibrium can be identified with the minimum of a smooth, well-defined potential function. Small changes in certain parameters of a nonlinear system can cause equilibrium to appear or disappear, or to change from attracting to repelling and vice versa, leading to large and sudden changes of the behaviour of the system.

The catastrophe theory provides the theoretical justification for examining the relationships and impacts of macroeconomic variables on stock markets. This theory deals with the interactions between the short- and long-run dynamics and thus investigates events involving systematic changing factors which produce sudden effects on other forces (Birău, 2013).

Arbitrage Pricing Theory

It is reasonable that investors care about how their portfolio return relates to future investment opportunities, exchange rates, interest rates and other macroeconomic indicators. Thus a portfolio's return variance misses important dimensions of risk. Closely linked in ideology but fundamentally different in form is the Arbitrage Pricing Theory (APT) which was borne out of Ross's attempt to overcome the weaknesses of the CAPM. The basic thrust of the APT is that it relates the expected returns on assets to their factor sensitivities as well as capturing the

influences of non-market factors on securities (Ross, 1976). The key empirical strength of the APT lies in its flexibility in allowing researchers to select multiple sources of systemic risks and thus aids in providing best results for a particular sample (Groenewold & Fraser, 1997; Cagnetti, 2002).

Intuitively, portfolio theory typically relies on correlation between financial assets where low correlation results in diversification. However, Kasa (1992) reveals that low correlations could suggest overestimated gains especially when equity markets share a common stochastic trend in the long-term. Thus following Kasa (1992), researchers, academicians, financial analysts and investors have shifted attention from correlation analysis to cointegration, which has now been used extensively in literature in analyzing long-term portfolio diversification and impacts of macroeconomic variables on stock market returns.

The Linear or Symmetric Relationship Theory

This theory which has as its proponents, Hamilton (1983), Gisser (1985), Goodwin (1985), Hooker (1986) and Laser (1987) postulated that volatility in Gross National Product (GNP) growth is driven by oil price volatility. They hinged their theory on the happenings in the oil market between 1948 and 1972 and its impact on the economies of oil-exporting and importing countries respectively. Hooker (2002), after rigorous empirical studies demonstrated that between 1948 and 1972 oil price level and its changes exerted influence on stock market performance and Gross Domestic Product growth significantly. Laser (1987), who was a late entrant into the symmetric school of thought, confirms the symmetric relationship between oil price volatility, stock market performance and economic growth. After an empirical study

of her own, she submitted that an increase in oil prices necessitates a decrease in GDP and stock prices, while the effect of an oil price decrease on GDP is ambiguous, because its effects varied in different countries.

Theory of Equity Valuation

This theory was developed by Stacy Adams in the 1960s. The theory stipulates that the value of stock price is primarily determined by discounting all the future cash inflows by an appropriate cost of capital. According to this theory, the value of equity is computed by ascertaining the present value of all cash flows of the equity. The future cash flows will consist of dividend and the value of the equity itself at maturity or when it is sold. In practice, petroleum prices are expected to affect the purchasing power of the economy, affect industrial growth and investment, affect the earnings of corporate firms, dividend payment to investors, and consequently affect stock prices. When petroleum price increases for instance, one would expect firms' earnings to decrease since petroleum products are a major source of input for firms. As earnings decrease, the value of equity of the firm will also decrease and thus negatively affect the returns of investors. This means that petroleum prices could have an impact on the returns of the stock market of Ghana as a whole.

Based on the Theory of Equity Valuation and the Arbitrage Pricing Theory, the study hypothesized that petroleum price, income status and financial crises could affect the stock market returns of Ghana. Thus, the arbitrage pricing theory allows more variables to be included in the model that predicts the returns of stocks.

Pricing of petroleum products in Ghana

Petroleum products imported into the country by the Bulk Distribution Companies (BDCs) are regulated by the National Petroleum Authority with an objective of ensuring full cost recovery, government revenue generation and uniformity of prices through the Unified Petroleum Price Fund (UPPF). Full cost recovery within the value chain is based on the import parity pricing (IPP) benchmark (Ghana Energy Policy, 2009). The IPP benchmark (IEA, 2014) is the 'landed cost' of refined fuel to Ghana, which includes the international price for refined fuel brought in from Rotterdam for example (Freight on Board [FOB] Price), freight charges, exchange rate, customs and port duties, insurance and losses. It represents that the price that the BDCs (importers) would pay in case of actual import of product at the respective Ghanaian ports. The rationale behind the IPP benchmark is to have a strong relationship with the actual costs of fuel imports into Ghana taking into account global developments.

NPA employs a two-week inventory window (1st-16th of the month) whereby the two-week average of the FOB prices of the products is computed using a pricing reference such as Platts (Akinkugbe, 2013). The historical average exchange rate of cedi to the dollar within the two-week time frame is then forwarded into the equation (Kojima, Matthews, & Sexsmith, 2010). Ancillary charges such as port duties are then added to arrive at the Ex-refinery price calculated in Ghana pesewas per litre. Approved taxes and levies passed by Parliament are then added along with various Oil Marketing Companies (distribution) margins to arrive at the final Ex-pump price, which is the price the public buys fuel at the various filling stations.

Fuel taxes and margins typically make up about 35-40% of ex-pump fuel prices (Torny, 2015).

Brief History of Ghana's Oil and Gas Industry

Hydrocarbon exploration in Ghana began in 1896 by the West Africa Oil and Fuel Company (WAOFCO) who drilled in the area of Half-Asini. They were followed by the Société Française de Petrole, who began drilling in 1909, although exploration in the country from 1896 to 1967 was intermittent (Ghana Oil Watch, 2011).

The first major field, the Saltpond field, was discovered in 1970 by a Signal Amoco well, located approximately 100 kilometres west of Accra, and began producing in 1975. Between 1978 and 1985 a total of about 3.47 million barrels of oil was produced from the field and 14 billion cubic feet of gas was flared (Tullow Oil, 2012). By the end of 1980, 31 wells had been drilled, resulting in three discoveries- the Saltpond, Cape Three Points, and North and South Tano (Haruna, 2013).

Major and sustained exploration activity started with the formation of Ghana National Petroleum Corporation (GNPC) in 1985 and has continued until today (Haruna, 2013). Ghana's first petroleum law, the Ghana National Petroleum Corporation (GNPC) Law was passed in 1983, and in 1987 the enactment of the Petroleum Income Tax Law, again by the Provisional National Defence Council (PNDC) Government provided a separate tax regime for the petroleum sector (Ghana Oil Watch, 2011).

Between the years 1983 and 1989, the GNPC concluded several agreements with a number of foreign firms, and in 1989 the country's first and only refinery at Tema (as of 2011) underwent its first major rehabilitation. In June 2007, the GNPC announced a significant discovery of light oil offshore at the Jubilee Field together with partners Tullow Oil and Kosmos Energy. According to Tullow Oil, it was one of the biggest oil finds in Africa in recent times (Haruna, 2013).

The Jubilee field began producing in December 2010, and is estimated to hold 1.5 billion barrels of oil. In January 2012, Tullow Oil Plc, the lead company in Ghana's oil production, opined that it expected production at the Jubilee oil field for 2012 to average between 70,000 and 90,000 barrels per day (bpd) (Haruna, 2013).

The Jubilee field is reported to have 800 million barrels of proven reserves and an upside potential of about 3 billion barrels of oil. The government of Ghana is expected to receive several billion dollars in new revenues over the next two decades and how these new revenues are managed will be vital to Ghana's continuing development. Ghana has a chance to show that oil revenues can be managed and used in a transparent and accountable manner, and is seeking to avoid the —resource curse as experienced in other oil-rich countries. Ghanaians are hopeful that they will be able to avoid some of the problems related to the sudden onset of oil wealth, such as increased corruption, increased debt, Dutch Disease effects, and competition and conflict over resource revenues. Local and international observers have raised concerns that Ghana's enviable track record of economic, social and democratic development over the next 20 years may be affected by the challenges posed by the oil find (Public Interest and Accountability Committee Report, 2016).

Ghana's Stock Market

The Ghana Stock Exchange (GSE), incorporated in July 1989, is the principal stock exchange of Ghana located in the country's capital, Accra. The Exchange had its first trading activity on November 12, 1990. In April 1994, it converted into a public company limited by guarantee. Since then, the GSE's performance has varied greatly. All ordinary shares (with the exception of those of listed companies that have shares listed on other markets) are included in the main stock index, namely, the GSE Composite Index. The Exchange is governed by a council with representation from the listed companies, licensed dealing members, insurance companies, and the general public (GSE Report, 2016).

The Ghana Stock Exchange it must be noted, was set up to provide a platform for the purchase and sale of bonds, stocks, shares and other securities of every kind and for the investment of money. It is also to control the granting of quotations on the securities market in respect of bonds, shares and other securities of any company, corporation, government, municipality, local authority or other body corporate. Another key objective of the Ghana Stock Exchange was to cooperate with associations of stockbrokers and stock Exchanges in other countries and to obtain and make available to members information and facilities likely to be useful to them or their clients (GSE Report, 2016).

Performance of the Ghana Stock Exchange

It is in no doubt that the Exchange has been most impressive and has so much credibility at home and abroad. Index performance-wise, the GSE has acquitted itself so well that it emerged the 6th best performing emerging stock market posting a modest 113.73 per cent as early as in 1993, therefore performing better compared to stock markets of Nigeria and Kenya. A similar achievement was chalked a year later coming up again as the best performing stock market among all the emerging markets with an appreciation of 124.35 per cent in its All-Share index (GSE Report, 2016).

Given the deteriorating economic conditions with high inflation and interest rates, the Exchange could not perform well in 1999 as it made a loss of 15.22 per cent, signifying a bad performance ever recorded in the first ten years of the Exchange. In the year 2000, the stock market grew by posting a positive return of 16.55 per cent though dropping to 11.42 per cent in 2001 (GSE Report, 2016).

For the three years following 2001, the stock market made another turn of impressive performance. The All-Share Index grew considerably to 45.96 per cent in 2002. In 2003, the Ghanaian stock market recorded its highest return since its inception in 1990, by astronomical returns of 154.67 per cent, but reduced to 91.33 per cent in 2004 with a further loss of 29.72 per cent recorded in 2005. The stock market grew by 5.21 per cent in 2006, 31.21 per cent in 2007, and 58.16 per cent in 2008. For the period under review - 1990 to 2016, the all time worse performance of the Ghana stock exchange occurred in 2009 where an unparalleled loss of 46.58 per

cent hit the market. Whereas some experts attribute the loss to worsening domestic economic conditions, others are of the opinion that the financial crises which started in 2007 and lasted until 2009 must have partly contributed to the loss (Goodness, 2015).

The market recovered in 2010 when the All-share index was replaced with the Composite Index and rebasing set at 1000. This saw the market making away with a growth of 32.25 per cent in the year 2010. The growth could not sustain itself through 2011, therefore, a loss of 3.10 per cent was realised. The year 2012 reported a return of 23.81 per cent as against 78.81 per cent in 2013. After the surge of the high returns in the year 2013, the stock market of Ghana has not recorded any impressive performance for the years following to 2016. This is because there was a huge drop in the growth of the composite index's returns from 78.81 per cent in 2013 to only 5.40 per cent in 2014. The poor performance continued to see itself through for the years 2015 and 2016 where a loss of 11.77 per cent and 15.33 per cent were realised in 2015 and 2016 respectively, but a positive returns of 52.73 percent was recorded in 2017 (GSE Report, 2017).

Players in the industry suspect that the recent poor performance of the stock market of the country was as a result of the energy crises situation which militated against the performance of major sectors of the Ghanaian economy. During the same period, some key macroeconomic variables such as the exchange rate and inflation were not tolerable (GSE Report, 2017).

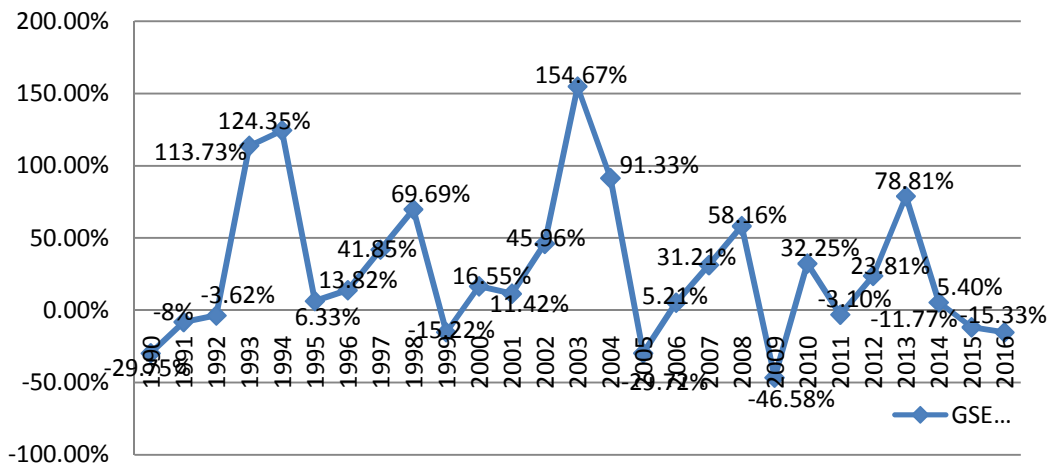


Figure 3: Ghana Stock Exchange Returns

Source: Field Survey, Andoh (2019)

Empirical Review

According to Cantore, Antinmiani and Anciaes (2012), a rise in oil price has an adverse effect on oil-importing countries making their input costs greater. Meanwhile, it is commonly thought that oil prices will benefit oil exporters through improved terms of trade, at least in the short run. However, if it is taken into account the decrease in world gross domestic product (GDP) induced by higher oil prices and the competitiveness (production costs) of non-oil sectors in oil-exporting countries, higher oil prices may eventually lower incomes in all developing countries (Cantore, Antinmiani, & Anciaes, 2012). The work of Cantore et al. (2012) estimated that, in terms of real GDP, African countries may suffer up to a 3% of Gross Domestic Product loss from a doubling of oil prices.

By employing the theory of equity valuation, Berk and Aydogen (2012) examined the shocks of crude oil price variations on the Turkish stock market

returns by employing vector autoregression (VAR) model using Daily observations of Istanbul Stock Exchange National Index (ISE-100) returns and Brent crude oil prices for the period between 1990 and 2011. Their analysis found that Variance decomposition test results propose a little empirical evidence that crude oil price shocks have been reasonably estimated in the Turkish stock market.

Osisanwa and Atanda (2012) employed the symmetric relationship theory and examined the determinants of the stock market returns in Nigeria by employing the Ordinary Least Square techniques using annual data for the period between 1984 and 2010. Their variables were consumer price index, exchange rate, broad money, interest rate, oil price and real per capita income. The findings showed that exchange rate, interest rate, money supply, oil price and previous stock return levels are the primary determinants of stock returns in Nigeria.

Furthermore, Narayan and Narayan (2010) studied the impact of oil prices on Vietnam's stock prices by employing the catastrophe theory. They established that oil prices have a positive and statistically significant impact on stock prices.

Adjasi (2009) used EGARCH model to study the relation between macroeconomic variables including oil price and the stock market of Ghana. The results showed that higher volatility in oil prices reduces volatility of stock prices. The report by Narayan and Narayan (2010) and that of Adjasi (2009) show a conflicting conclusion. That is, whereas there is a positive relationship between oil prices and stock prices in Vietnam, the relationship is negative in Ghana. The differences may be as a result of the dominance of the oil producing firms listed on

the Vietnam stock market as compared to that of Ghana as well as differences in the methodology of their works.

El-Sharif, Brown, Burton, Nixon, and Russell (2005) sought to investigate the relationship between the price of crude oil and equity values in the oil and gas sector using data relating to the United Kingdom. The findings show that, the relationship is always positive. They found that the relationship is often highly significant and it connotes a direct impact of volatility in the price of crude oil on share values. Employing a multivariate vector-auto regression (VAR) method, Papapetrou (2001) examined the dynamic relationship between oil prices and real stock prices for Greece. The results suggest that oil prices are important in explaining stock price movements. Miller and Ratti (2009) analyzed the long-run relationship between the world price of crude oil and international stock markets. They established that stock market indices respond negatively to increases in oil price in the long run in six (6) OECD countries. In a similar study, Park and Ratti (2008) concluded that Norway exhibits a positive response in real stock returns to an oil price increase. They also found that for many European countries increased volatility of oil prices depresses real stock returns. Using a bivariate GARCH method, Malik and Ewing (2009) examined the volatility dynamics between five different US sector indexes and oil prices. They found evidence of transmission of shocks and volatility between oil prices and some of the examined market sectors.

Regarding other emerging markets, Chen and Lv (2015) examined the asymptotic dependence between the Chinese stock market and the world crude oil market employing the theory of equity valuation. They found a positive extremal

dependence of crude oil on the Chinese stock market. Using a VAR model, Cong, Wei, Jiao, and Fan (2008) employed catastrophe theory and investigated the relationships between oil price shocks and returns on the Chinese stock market. They found that oil price shocks have significant effect on the Chinese stock market.

Kapusuzoglu (2011) studied the long-term and short-term dynamics between Istanbul Stock Exchange (ISE) market and international Brent oil price using the linear or symmetric relationship theory. They found a long term relationship between the stock and oil markets. They also observed that there was one-way causal relationship from the stock exchange market to oil price. Maghyereh and Al-Kandari (2007) used the arbitrage pricing theory and a nonlinear cointegration model to examine the linkages between oil prices and stock market in the Gulf Cooperation Council (GCC). They found that oil price impacts the stock price indices in GCC countries in a nonlinear fashion.

Using the arbitrage pricing theory, Arouri, Lahiani, and Nguyen (2011) studied the linkages between the oil and stock markets in the Gulf Cooperation Council (GCC) countries. They found evidence of substantial return and volatility spillovers between world oil prices and GCC stock markets. Using bootstrap panel cointegration techniques and seemingly unrelated regression (SUR) methods, Arouri and Rault (2012) studied the GCC stock and oil market. They found that with the exception of Saudi Arabia, it was noted that oil price increases have a positive impact on stock prices.

In conclusion, the various empirical studies reviewed here showed mixed results and conclusions. In some studies, strong positive relationships are found to exist between stock returns and macroeconomic fundamentals and in some the relationship is a bit weak. Other researchers report different results. This mixture of findings and conclusions emanates from differences in methodology, variables used and the period of study. There is also disparity in study area that fundamentally affects the behaviour of the variables under study and hence the various conclusions.

Chapter Summary

This study was primarily underpinned by the catastrophe theory, linear or symmetric relationship theory, theory of equity valuation and the arbitrage pricing theory. The focus of this research, therefore, was based on these four fronts. It bridged the gap created by some of the reviewed studies by employing a different methodology and study area. Again, the use of 1990-2017 study periods is a great improvement to literature. Finally, whereas most studies had focused on examining the relationship between crude oil price and the stock market returns, this study looked at the relationship between petroleum price and stock market returns of Ghana.

CHAPTER THREE

RESEARCH METHODS

Introduction

Chapter three focuses on the research method employed in the study. It discusses the research design, the study area, data collection instrument, data collection procedure, data processing, various models used in the study as well as the summary of the chapter.

Research Approach

The study is entirely quantitative thereby using the positivism approach. With regards to quantitative approach, it is generally seen as an objective way of undertaking scientific investigation in the field of finance and economics. The study therefore adopted a quantitative approach so that the findings of the study could be generalised.

Research design

The study was conducted in Ghana and specifically was tailored to the Ghana Stock Exchange. To be precise, the study utilised the All-Share and Composite Index of the Ghana Stock Exchange from which the stock market returns was measured. This means that all the 42 tradable equities from the 37 companies currently listed on the Ghana Stock Exchange were considered in the study. The study investigated the long term and short term relationship between petroleum price and returns of the Ghana Stock Exchange by basing the analysis on a quantitative study and inferential

statistics. For the purposes of the stated objectives of this study, the explanatory research design was appropriate for use. This is because the study examined the cause and effect between stock returns, petroleum price and other macroeconomic variables.

Data Collection Procedure and Data Processing

All the data used for this study were collected from Bank of Ghana website, specifically from the monetary time series data from 1990 to 2017 on monthly frequency; except the GDP annual data that was collected from the World Development Indicators (WDI) of the World Bank and world refined petroleum and diesel prices which were collected from Bloomberg.com. The data collected were thus, All Share Index (ASI) and Composite Index, Petroleum Prices (PP), 91 day Treasury bill rate as a proxy for interest rate (IR), the cedi to the dollar exchange rate as a proxy for exchange rate (ER) since the dollar is the widely quoted currency in international trade, Consumer Price Index Overall (CPI) as a proxy for inflation, gross domestic savings, gross domestic product per capita as proxy for economic growth, foreign direct investment, and M3 as a proxy for money supply (MS).

The dependent variable was the returns of the stock market (SR) which was computed as the All-Share Index minus one period lag of the All-Share Index divided by the one period lag of the All-Share Index. That is, $(ASI - ASI(-1))/ASI(-1)$. For obvious statistical reasons, all the variables were taken in their log form except stock returns which was taken in the non log form due to the presence of negative returns in the data. In ensuring that the monetary figures reflect the

domestic economic conditions, all monetary data that were collected in the United States Dollar were converted into the Ghana Cedi by using the end of month exchange rate. The entire data was processed by using econometric views (E-views) version 9. The data collected at annual level were converted into monthly level using e-views and the linear function.

Models Specification

The study adopted the autoregressive distributed lag (ARDL) model to investigate objective 1 of this study which assessed the short and long term relationships between petroleum prices and stock market returns of Ghana. Objective 2 underscored the causality between petroleum prices and stock market returns and the control variables. This investigation was done by using the granger causality test. Objective 3 investigated the moderating effect of the 2007/08 financial crises and the lower middle income status of Ghana on the relationship between petroleum prices and stock market returns. This investigation was carried out by using the Ordinary Least Square model. Since stock returns are both negative and positive, the theoretical model used for this study based on the arbitrage pricing theory is thus stated in the linear log function as indicated by equation 1.

$$SR = B_0 + B_1 \ln X_1 + B_2 \ln X_2 + e \quad (1)$$

Where SR is stock returns, X_1 is the proxy for petroleum price which is the main independent variable, X_2 is the proxy for control variables used in the study, e is the stochastic error term, B_0 is the constant, and B_1 and B_2 are the coefficients of the petroleum price and control variables.

Time Series Properties of the Variables

The variables were tested for their time series properties by using unit root test. The test for unit root in the variables was investigated by using the Augmented Dickey Fuller (ADF) test and Phillips-Perron (PP) test. The ADF and PP were tested on the null hypothesis that the variable has a unit root (non-stationarity). The preliminary test revealed that stock returns is stationary at level and all the independent variables with the exception of gross domestic savings were stationary at first difference. This means that stock returns, petroleum price, money supply, foreign direct investment, interest rate, exchange rate and consumer price index could be used in the ARDL model. Gross domestic savings was excluded from the ARDL model since it is stationary at the second difference. The ADF test was defined by equations (2) and (3):

$$\Delta y_t = B_1 + B_2 t + B_3 y_{t-1} + \sum_{i=1}^m a_i \Delta y_{t-i} + e_t \quad (2)$$

The PP test was defined as:

$$\Delta y_t = B_1 + B_2 t + B_3 y_{t-1} + \pi y_{t-1} + \epsilon_t, \epsilon_t \sim I(0) \quad (3)$$

The Autoregressive Distributed Lag Model (ARDL)

To model data appropriately and extract long run and short run relationships, the ARDL model is a good choice (Owusu & Anokye, 2016). The ARDL model combines the features of both autoregressive (AR) and the distributed lag (DL) models to manage a more general dynamic regression model. Lagged values of explanatory variables or of the dependent variable (or both) may capture important dynamic structure in the dependent variable that might be caused by a number of

factors. Pesaran and Shin (1998) and Pesaran, Shin & Smith (2001) itemised some features of the ARDL or bounds testing methodology of cointegration to include the following. They presented that the data being modeled must be stationary at level $I(0)$ or at first difference $I(1)$ but not at the second difference $I(2)$. They also captured that the model involves just a single-equation set-up, making it simple to implement and interpret. Also, different values can be assigned different lag-lengths as they enter the model.

To use the ARDL model, the researcher ensured that none of the variables are integrated at the second difference $I(2)$ and the unrestricted error correction model was formulated. The appropriate lag structure was determined for the ARDL model by using the Akaike Information Criterion. Serial correlation test was checked to ensure that the errors of the model are serially independent. Also, parameter stability test was conducted by using the CUSUM test to ensure that the model is dynamically stable. Bound testing was performed to see if there is evidence of a long run relationship between the variables in question. When the evidence of long run relationship was found between the variables, the long run level models were estimated as well as a separate restricted Error Correction Model (ECM). Finally, the results of the long run levels model as well as the restricted ECM were used to measure short run dynamic effects, and the long run equilibrating relationship between the variables.

The compact form of the ARDL model for analysing objective one and two was thus estimated as indicated in equation 4.

$$\begin{aligned}
\Delta SR_t = & \beta_1 + \sum_{i=1}^a \beta_2 \Delta SR_{t-i} + \sum_{i=0}^b \beta_3 \Delta LCPI_{t-i} + \sum_{i=0}^c \beta_4 \Delta LPP_{t-i} + \sum_{i=0}^d \beta_5 \Delta LIR_{t-i} \\
& + \sum_{i=0}^e \beta_6 \Delta LER_{t-i} + \sum_{i=0}^f \beta_7 \Delta LM3_{t-i} + \sum_{i=0}^g \beta_8 \Delta LFDI_{t-i} + \phi_1 LSR_{t-1} + \phi_2 LCPI_{t-1} \\
& + \phi_3 LPP_{t-1} + \phi_4 LIR_{t-1} + \phi_5 LER_{t-1} + \phi_6 LM3_{t-1} \\
& + \phi_7 LFDI_{t-1} + \mu_t \tag{4}
\end{aligned}$$

Where SR = stock returns of All-Share Index

LCPI = log of Consumer Price Index

LPP = log of Petroleum Price

LIR = log of Interest Rate

LER = log of Exchange Rate

LM3 = log of M3 money supply

LFDI = log of foreign direct investment

t = Time series

β_1 to β_8 and ϕ_1 to ϕ_7 = Coefficient of dependent and independent variables

a to g represent the highest lag length for the variables

μ = Error term

Gross domestic product per capital was integrated of order 2; hence it was excluded from the ARDL model estimation.

Ordinary Least Square (OLS) Model

The most common method used to fit a line to the data is known as Ordinary Least Squares (OLS). This approach forms the workhorse of econometric model estimation (Brooks, 2008). The OLS approach to estimating the coefficients is by making the squares of the error term as small as possible, asymptotically zero, hence the name least squares. Thus, the OLS regression was used to assess the moderating effect of 2007/2008 financial crises and lower middle income status of Ghana on the relationship between petroleum prices and stock returns of the Ghana Stock Exchange. All hypotheses testing were performed at 5% significant level. The necessary regression diagnostics as well as the various assumptions of OLS were tested to ensure that no spurious regression is obtained.

The key regression diagnostics that were performed in the study included the goodness of fit test for the dependent variable by observing the size of the R-square and the adjusted R-square. The higher the R^2 , the better the Goodness of fit of the dependent variable of the model. Test of significance of the independent variables was also performed by using 5% significant level. Other tests that were performed include multicollinearity test, heteroscedasticity test, and test of autocorrelation.

To analyse objective 3, that is, assessing the moderating effect of 2007/2008 financial crises and lower middle income status of Ghana on the relationship between petroleum prices and stock returns of the Ghana Stock Exchange, the OLS regression was expanded to capture 'financial crises' (FC) as part of the regressors. Since the financial crises is a categorical variable, 1 was used to represent the periods in which the financial crises occurred and persisted, from August 2007 to

November 2008 (Mano, 2019) and 0 used to denote the periods without the financial crises. Income Status (IS) was included as part of the regressors so as to examine its moderating effect on the petroleum prices and stock market returns relationship. Since Ghana was declared a lower middle income status in November 2010 (Sakyi, 2011), code of 1 was used to represent periods from November 2010 and 2017, whereas 0 was used to represent all periods between 1990 up to 2009.

The estimable equation for analysing objective 3 is presented in equation 5.

$$SR_t = \beta_0 + \beta_1 LER_t + \beta_2 LIR_t + \beta_3 LCPI_t + \beta_4 LMS_t + \beta_5 LGDPPC_t + \beta_6 LPP_t + \beta_7 FC + \beta_8 IS + \beta_9 LGDS + \beta_{10}(LPP \times FC) + \beta_{11}(LPP \times IS) + \mu_t \quad (5)$$

Where SR = stock returns of All-Share Index

LER = log of exchange rate

LIR = log of interest rate

LCPI = log of consumer price index

LMS = log of money supply

LGDPPC = log of gross domestic product per capita

GDS = Gross domestic savings

LPP = log of petroleum price

FC = Financial crises

IS = Income status

β = the coefficients of the independent variables

The interaction terms in the equation is meant to capture the moderating effect of the regressors on the stock market returns.

Description of Variables

Explained below are the variables which the study uses.

Stock Returns (SR)

Ghana stock exchange market's All Share Index/Composite Index was used in determining the stock returns (SR) of the all share index. The All share index (ASI) is a broad market indicator of the stock market, which measures the overall performance of the stock market and it was used as the dependent variable. Returns of All Share Index represent the returns of the Stock market of Ghana. It was obtained as: $SR_t = (ASI_t - ASI_{t-1}) / ASI_{t-1}$, where SR_t is the returns of the All Share Index for a period t, ASI_t is the value of All Share Index at time t and ASI_{t-1} is the one period lag value of the All Share Index. This measure of stock returns is supported by the study of Banor (2014) who examined the effect of macroeconomic variables on stock returns in Ghana. The measure of stock returns in this study also agree with that of Berk and Aydoganb (2012) who investigated into crude oil price shocks and stock returns in the Turkish Stock Market.

Consumer price index (CPI)

Consumer price index is used as a proxy for measuring inflation. Rising inflation increases the cost of living and shifts resources from investments to consumption. This brings about a fall in demand for market instruments, which in return leads to reduction in the volume of stock traded. Nkoro and Uko (2013) posit that the monetary policy responds to the increase in the rate of inflation with economic tightening policies, which in turn increases the nominal risk – free rate and

hence, raises the discount rate which results in reduction of present value of cash flows so it is said that an increase in inflation is negatively related to stock prices. Chen, Roll and Ross (1986), Barrows and Naka (1994), Mukherjee and Naka (1995) and Wongbangpo and Sharma (2002) conclude that inflation has negative effects on the stock market. Conclusively, there is a negative relationship between inflation rate and stock prices/returns.

Exchange rate (ER)

In recent years, all businesses are directly and indirectly affected by international activities as a result of globalization (Kuwornu & Victor, 2011). In other words, exchange rate changes may affect the competitive position of companies and hence industries operations. As a result, cost of goods and services, sales and cash flows may change with changes in exchange rate. Ozcam (1997) and Altay (2003) revealed that exchange rates influence stock returns.

In Ghana the cedi-dollar exchange rate is important in assessing the stock market because, being the major international trading currency, any hike is translated in the cost of importing raw material, and other imports (Kuwornu & Victor, 2011). Since Ghana's economy is also import-demand driven, changes in the exchange rate affects most sectors of the economy as well as the pricing of goods and cost of production. The exchange rate, therefore, affects business cash flow and profitability. Investors may also evaluate this as an important risk factor.

According to Pebbles and Wilson (1996), an appreciating currency is generally accompanied by increases in reserves, money supply and a decline in

interest rates. The resulting decline in cost of capital and/or imported inputs is expected to lead to an increase in local returns. Such an expectation is consistent with Bilson, Brailsford, and Hooper (2001) conclusion that a devaluation of the domestic currency has a negative relationship with returns.

Interest rate (IR)

The 91-Day Treasury bill rate was used as proxy for interest rate since Treasury bill serves as the opportunity cost of holding shares and as a benchmark for measuring interest rate. Chen, Roll, and Ross (1986), Beenstock and Chan (1988), Fifield, Power, and Sinclair (2002), provide evidence on the relationship between interest rates and stock returns. High interest rate regimes lead to high cost of borrowing and hence a reduction in economic activity. This also affects corporate profit, future cash flow of business and dividend. According to the “Fisher effect”, expected nominal rate of interest on financial assets should move one-to-one with inflation (Fisher, 1930).

Moreover, changes in both short term and long-term rates are expected to affect the discount rate in the same direction through their effect on the nominal risk-free rate (Mukherjee & Naka, 1995). Therefore interest rates are expected to be negatively related to market returns either through the inflationary or discount factor effect. However, the continued use of interest rates may be attributed to the absence of active secondary markets for bond issues and government paper in many emerging markets (Bilson, Brailsford, & Hooper, 2001).

Money supply

Though the economic impact of money supply changes has been debated, yet few propositions about the stock market have a universal acceptability (Issahaku, 2013). However, most members of the financial community in Ghana probably agree that changes in the Bank of Ghana monetary policy strongly influence the Ghana stock market. Empirical findings by Badarudin, Ariff, & Khalid (2011), reported the influence of the rate of monetary growth on the stock market. Their findings demonstrates the extent to which money supply moves are now treated as superior indicators of trends in central bank monetary policy and how trends in the money supply can provide information about future stock price movements. The study by Badarudin, Ariff, and Khalid (2011), found a new evidence of a direct correlation between endogenous money supply and aggregate bank stock return.

Sellin (2001) argues that the money supply will affect stock returns only if the change in money supply alters expectations about future monetary policy. He argues that an increase in money supply will lead people to anticipate tightening monetary policy in the future. The subsequent increase in bidding for bonds will drive up the current rate of interest. As the interest rate goes up, the discount rates go up as well, and the present value of future earnings decline. As a result, stock prices returns. Furthermore, Sellin (2001) argues economic activities decline as a result of increases in interest rates, which further depresses stock prices and returns. This study therefore expected a negative relationship between money supply and stock returns.

Gross domestic savings (GDS)

Gross Domestic Savings can affect economic growth and stock market returns through the workings of the interest rate. Lower rate of savings can reduce gross domestic savings and investors may channel their excess cash to purchase stocks on the stock market given favourable taxes and inflation. This means that the stock market may be boosted during periods of low savings following lower interest rates. Higher interest rates may encourage investors to shift their investment from risky assets to less risky ones by way of doing more savings. Thus, higher savings may reduce investment on the stock market which can lower the stock market returns. To this extent, Liu and Garcia (1999) opposed that heavy domestic savings in the country results in higher quantity of capital inflows through the stock markets. Gross domestic savings (current US\$) is used as a proxy for Gross Domestic Savings (GDS) and sourced from the World Bank Development Indicator database. This study thus expected a negative relationship between Gross Domestic Savings (GDS) and Stock Market Returns.

Foreign direct investment (FDI)

FDI is an important tool that can be capitalized on to boost stock market returns (SR). It can also play the role in raising domestic savings in the country through enhancement of technology transfer and creation job opportunities (Singh, 1997). Haruna (2013) found positive and statistically strong relationship between FDI and stock market returns. In this study, foreign direct investment net inflows

(current US\$) was used as a proxy for FDI and sourced from the World Bank Development Indicator Database.

Economic growth (GDPPC)

In this study, economic growth was proxied with the gross domestic product per capita. The expansion or increase in the per capita income of an economy represents growth in opportunities in the investment environment. Thus, as the economy grows, there would be an incentive to save or invest aspects of the income for speculative purposes. The demand of assets on the stock market will raise the price of assets and in the long run increase the returns of the stock market holding all other factors constant. Thus, this study expects a negative relationship between economic growth and stock market returns.

Table 1 gives the summary of the key variables that were used in the study, the proxies representing such variables, the sources of data of each variable and the frequency of data collected including the type of data.

Table 1: Summary Information of Variables

Variable	Proxy	Source	Type of Data
SR	ASI/CI	BoG	Time series
PP	PP	BoG	Time series
Inflation	CPI	BoG	Time series
ER	GHS/\$	BoG	Time series
MS	M3	BoG	Time series
IR	TBR – 91	BoG	Time series
EG	GDPPC	WDI	Time series
GDS	GDS	WDI	Time series
FC	FC	-	Dummy
IS	IS	-	Dummy

Source: Andoh (2019)

From Table 1, SR denotes stock returns, PP is petroleum price, ER is exchange rate, MS is money supply, IR is interest rate, GDPPC is gross domestic product per capita, TBR – 91 is the 91-day Treasury bill rate, M3 is the proxy for money supply, CPI is consumer price index, ASI/CI is the All-share Index/Composite Index, BoG denotes Bank of Ghana, WDI is World Development Indicators, and GHS/\$ is the Ghana cedi to the United States of America dollar exchange rate, GDS denotes gross domestic savings, EG means economic growth, FC means financial crises, and IS means income status.

Chapter Summary

This chapter discussed the research methods that the study employs. The chapter indicated that the study is entirely quantitative and that the ARDL and the Ordinary Least Squares models were used. It also discussed the variables used in the study as well as the time series properties of the variables. The chapter ends with the summary of the elements captured in the chapter.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

The purpose of this study was to investigate the effect of petroleum price on the stock market returns of Ghana. The study used the autoregressive distributed lag (ARDL) model to examine the cointegration relationship between petroleum price and stock market returns with the help of five other control variables. The control variables used were consumer price index as a measure of inflation, M3 as a measure of money supply, foreign direct investment as a measure of investment, the cedi to the US dollar end of month exchange rate as a measure of exchange rate, and 91 day Treasury bill as a measure of interest rate. The third objective of the study used the ordinary least square regression to assess the moderating effect of 2007/2008 financial crises and Ghana's lower middle income status on the relationship between stock returns and petroleum price. The results and discussion are captured in this chapter.

Time series graph of the ADRL variables

The pictorial view of the graph in Figure 4 is suggestive that the variables in question move together towards a long run relationship. The Figure portrays a linear trend among the variables with the FDI showing a far-reaching positive trend as against all other variables.

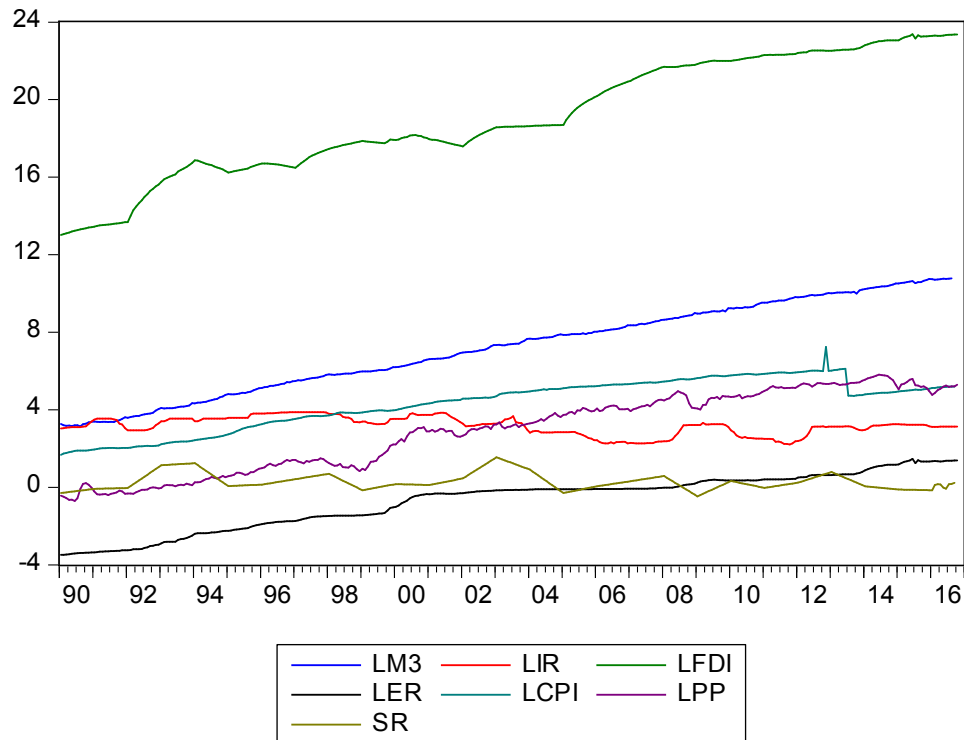


Fig. 4: Time series plot of SR, PP and macroeconomic variables

Source: Field Survey, Andoh (2019)

Unit root test

Table 2 indicates that the null hypothesis for both ADF and PP were rejected and the conclusion of stationarity was achieved for SR at $I(0)$ and $I(1)$ for the independent variables. This means that stock returns is stationary at levels whereas all the independent variables were stationary at first difference. With respect to the KPSS, the null hypothesis of stationarity could not be rejected at 5% significant level. All the variables under KPSS were stationary at levels. Since none of the variables is stationary at the second difference, a mixture of $I(0)$ and $I(1)$ is a good result for the ARDL model. The summary result for the unit root test is shown in Table 2.

Table 2: Unit root tests

Variable	ADF	PP	KPSS
SR	I(0) [0.0019]	I(0) [0.0212]	I(0) [0.184927]
LPP	I(1) [0.0000]	I(1) [0.0000]	I(0) [2.070179]
LM3	I(1) [0.0407]	I(1) [0.0000]	I(0) [2.094497]
LFDI	I(1) [0.0000]	I(1) [0.0000]	I(0) [2.052377]
LIR	I(1) [0.0000]	I(1) [0.0000]	I(0) [0.858754]
LER	I(1) [0.0000]	I(1) [0.0000]	I(0) [1.987406]
LCPI	I(1) [0.0009]	I(1) [0.0000]	I(0) [1.847322]

The probability values are presented in parenthesis.

Source: Field Survey, Andoh (2019)

Optimal ARDL selection

To select the optimal model by information criteria the study estimated the ARDL (a, b, c, d, e, f, g) with a lag number of 8 for the dependent variable and 3 for the independent variables to recalculate the lags a, b, c, d, e, f, and g for the model. The study found that the best selected model is ARDL (7, 0, 0, 0, 2, 0, 2) by Akaike Information Criterion (AIC). To see that ARDL (7, 0, 0, 0, 2, 0, 2) is the best model, it could be seen from Figure 1 in Appendix C that ARDL (7, 0, 0, 0, 2, 0, 2) has the least AIC value of -4.058 as compared to all other lag orders making it the best model.

From Table 1 in Appendix C, the current level of stock returns is determined by the first to seven period lag of stock returns, the current levels of petroleum price, interest rate, consumer price index, money supply, and the current level of exchange rate to the second period lag as well as the current level of FDI to the second period lag of FDI.

Serial correlation test

The study diagnosed the errors of the ARDL (7, 0, 0, 0, 2, 0, 2) for serial correlation. The Durbin-Watson (DW) statistic of 1.969 is a good indication of no serial correlation, but a further test with serial correlation LM Test was conducted and the result is shown in Table 2 in Appendix C. From Table 2 in Appendix C, the probability of the F-statistic $F(0.125019)$ is 0.8825 which is greater than 0.05 significant level. We cannot reject the null hypothesis of no serial correlation in the error terms at the 5% level of significance.

Dynamic stability evaluation

Since there is no ARMA term in the ARDL (7, 0, 0, 0, 2, 0, 2) to evaluate roots for unity, the study looked at the fitted, residual, and actual plots to examine the dynamic stability of the model in Figure 2 in Appendix C. It does seem that the fitted model closely related the data with stationary residual.

Bounds testing

The evidence of long run cointegration was tested using the Wald test to assess if the coefficients of the “Unrestricted ECT” part of the estimated model are simultaneously zero. That is to say that a test for the existence of long run relationship was carried out using the F statistic.

The null hypothesis is thus stated in equation (6):

$$H_0: C(1) = C(12) = C(16) = 0 \quad (6)$$

From equation 5, C(1), C(12), and C(16) are the error correction coefficients which were the one period lags coefficients extracted from Table 1 in Appendix C. The Bounds test (F test) output specified in equation (6) is displayed in Table 3.

Table 3: Long run relationship test of ARDL (7, 0, 0, 0, 2, 0, 2) model.

Wald Test:			
Equation: ARDL (7, 0, 0, 0, 2, 0, 2)			
Test Statistic	Value	df	Probability
F-statistic	259.0301	(3, 295)	0.0000
Chi-square	777.0903	3	0.0000
Null Hypothesis: C(1)=C(12)=C(16)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)	Value	Std. Error	
C(1)	1.581841	0.056811	
C(12)	0.595788	0.163212	
C(16)	-0.616769	0.128792	

Source: Field Survey, Andoh (2019)

It is clear from Table 3 that we fail to reject the null hypothesis of no long run relationship in the ARDL (7, 0, 0, 0, 2, 0, 2) at the 5% significant level. This is so because the probability value of the F statistic (259.0301) of 0.0000 is less than

5% hence we reject the null hypothesis and conclude that the coefficients of C(1), C(12), and C(16) are not jointly zero. In other words, there is evidence of long run relationship among the variables.

As an alternative test for cointegration, Bounds test was also conducted to see the existence of long run cointegration evidence. The summary of the Bounds test is shown in Table 4.

Table 4: Bounds Test for ARDL (7, 0, 0, 0, 2, 0, 2) model

ARDL Bounds Test		
Sample: 1990M08 2017M12		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	k
F-statistic	3.330871	6
Critical Value Bounds		
Significance	I0 Bounds	I1 Bounds
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

Source: Field Survey, Andoh (2019)

Since the F statistic value of 3.330871 exceed both the I(0) and I(1) at the 10% and 5% significant levels we reject the null hypothesis that no long run relationship exists in the ARDL(7, 0, 0, 0, 2, 0, 2) model; in conformity with the Wald test results discussed earlier.

Long Run Model

Having established a long run relationship in the ARDL (7, 0, 0, 0, 2, 0, 2) model, the long run levels model was estimated using Ordinary Least Square (OLS) regression as indicated by equation 6 and presented in Table 5 as well as a separate “restricted” Error Correction Model (ECM) indicated by equation 12 and presented in Table 6.

$$SR_t = \beta_0 + \beta_1 LPP_t + \beta_2 LIR_t + \beta_3 LCPI_t + \beta_4 LER_t + \beta_5 LM3_t + \beta_6 LFDI_t + \mu_t \quad (6)$$

Table 5: Long run model

Dependent Variable: SR

Method: Least Squares

Sample (adjusted): 1990M01 2017M12

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	0.621133	0.693023	0.896267	0.3708
LPP	-0.029186	0.075752	-0.385289	0.7003
LIR	0.010702	0.071454	0.149778	0.8810
LCPI	0.065179	0.054559	1.194649	0.2331
LER	0.379849	0.104516	3.634352	0.0003
LM3	-0.476114	0.098537	-4.831811	0.0000
LFDI	0.164537	0.041732	3.942727	0.0001
R-squared	0.834069	Mean dependent var		0.295353
Adjusted R-squared	0.817470	S.D. dependent var		0.418678
S.E. of regression	0.393319	Akaike info criterion		0.993242

Sum squared resid	48.42112	Schwarz criterion	1.075674
Log likelihood	-151.9187	Hannan-Quinn criter.	1.026159
F-statistic	8.076782	Durbin-Watson stat	1.920937
Prob(F-statistic)	0.000000		

Source: Field Survey, Andoh (2019)

From Table 5, the long run equation is formulated as shown in equation 8.

Long run regression equation:

$$SR_t = 0.621133 - 0.029186LPP_t + 0.010702LIR_t + 0.065179LCPI_t + 0.379849LER_t - 0.476114LM3_t + 0.164537LFDI_t + \mu_t \quad (8)$$

As evidenced from Table 5, only three variables namely exchange rate, money supply and foreign direct investment are significant (at 5% significant level) in determining the level of stock returns in Ghana in the long run. The final long run equation estimated using only significant variables is indicated by equation 9.

Final long run regression equation:

$$SR_t = 0.379849LER_t - 0.476114LM3_t + 0.164537LFDI_t + \mu_t \quad (9)$$

Conclusion can be drawn from equation (8) that petroleum price negatively affect the stock returns of Ghana but the effect is statistically insignificant at 5% level. Interest rate and consumer price index all do have a positive influence on stock returns but the impact is also insignificant at 5% level. Thus, petroleum price, interest rate and inflation (CPI) do not significantly affect stock returns in the Ghana

at least in the long run. Equation (9) reveals that exchange rate and foreign direct investment have significant positive effect on stock returns in Ghana whereas money supply does have a significant negative effect on the stock market returns.

Since the functional form of the regression equation is in the linear-log form, we determine the exact long run impact of exchange rate, money supply and foreign direct investment on stock market returns by using partial derivatives as indicated by equations (10), (11), and (12).

The coefficient of LER (β_4) is:

$$\beta_4 = \frac{\frac{d(SR)}{d(LER)}}{ER} = 0.379849 \quad (10)$$

This is interpreted to mean that the change in stock returns brought about by a percentage change in exchange rate holding all other factors constant is 0.379849. This further means that a 1 percent increase in exchange rate will lead to a 0.00379849 (that is, 0.379849/100) unit increase in stock returns. That is to say that stock returns change in proportion to percentage change in the exchange rate. Thus, neither the slope nor the elasticity is constant.

The coefficient of LM3 (β_5) is:

$$\beta_5 = \frac{\frac{d(SR)}{d(LM3)}}{M3} = -0.476114 \quad (11)$$

This means that the change in stock returns brought about by a percentage change in money supply holding all other factors constant is -0.476114. This further

indicates that a 1 percent increase in money supply leads to a 0.00476114 (that is, 0.476114/100) unit decrease in stock returns.

The coefficient of LFDI (β_6) is:

$$B_6 = \frac{\frac{d(SR)}{d(LFDI)}}{FDI} = 0.164537 \quad (12)$$

This means that the change in stock returns brought about by a percentage change in foreign direct investment holding all other factors constant is 0.164537. This further reflects that a 1 percent increase in FDI leads to a 0.00164537 (that is, 0.164537/100) unit increase in stock returns.

Short Run Model

A separate “restricted” Error Correction Model (ECM) indicated by equation (13) and presented in Table 8 was formulated so as to obtain the long run cointegration equation.

$$\Delta SR_t = \beta_0 + \beta_1 \Delta LPP_t + \beta_2 \Delta LIR_t + \beta_3 \Delta LCPI_t + \beta_4 \Delta LER_t + \beta_5 \Delta LM3_t + \beta_6 \Delta LFDI_t + \beta_7 ECT(-1) + \mu_t \quad (13)$$

Where Δ is the difference operator and $ECT(-1)$ is the one period lag of the error correction term which reflects the speed of adjustment towards a long run equilibrium.

Table 6: Short Run Model

Dependent Variable: D(SR)

Method: Least Squares

Sample (adjusted): 1990M01 2017M12

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	-0.009834	0.003933	-2.500808	0.0129
D(LPP)	-0.035773	0.030159	-1.186144	0.2365
D(LIR)	0.031183	0.047040	0.662914	0.5079
D(LCPI)	0.011020	0.022445	0.490968	0.6238
D(LER)	-0.381046	0.120527	-3.161506	0.0017
D(LM3)	0.053431	0.093603	0.570829	0.5685
D(LFDI)	0.466767	0.056779	8.220748	0.0000
ECT(-1)	-0.019084	0.007391	-2.582036	0.0103
R-squared	0.690774	Mean dependent var		0.001495
Adjusted R-squared	0.672560	S.D. dependent var		0.055963
S.E. of regression	0.050906	Akaike info criterion		-3.092919
Sum squared resid	0.805927	Schwarz criterion		-2.998494
Log likelihood	501.3206	Hannan-Quinn criter.		-3.055209
F-statistic	10.47398	Durbin-Watson stat		1.554977
Prob(F-statistic)	0.000000			

Source: Field Survey, Andoh (2019)

Speed of Adjustment

From Table 6, we note that the coefficient of the error correction term, ECT(-1) is negative and significant and this is appropriately so since there is a

cointegrating relationship amongst the variables. The magnitude of the ECT is approximately 0.02 (that is, 2%). This implies that nearly 2% of any disequilibrium among the market is corrected within one month. In generic terms, the coefficient of the ECT(-1) is the parameter indicating the speed of adjustment to the equilibrium level after a shock. This means that the whole system correct itself back to equilibrium in the long run at a speed of 2%. In other words, it takes $\frac{100\%}{2\%} = 50$ (that is, 50) months for the system to adjust to long run equilibrium. As a rule of thumb, the coefficient of the ECT must be negative and statistically significant to ensure convergence of the dynamics to the long-run equilibrium.

Again, from Table 6, we note the short run coefficients or variables to be log of petroleum price, log of exchange rate, log of interest rate, log of consumer price index, and log of foreign direct investment, but the first difference of each variable was taken. At a significant level of 5%, the results shown in Table 6 concluded that the constant term, exchange rate, and foreign direct investment are the only variables that are statistically significant in predicting the level of stock returns. The results thus indicate that in the short run, changes in exchange rate negatively impacts changes in stock market return whereas changes in foreign direct investment positively influence changes in stock market returns. Thus, changes in consumer price index, interest rate, petroleum price, and M3 money supply do not influence the changes stock market in the short run.

The short run equation is thus stated as indicated in equation (14).

$$\Delta SR_t = -0.009834 - 0.381046 \Delta LER_t + 0.466767 \Delta LFDI_t + \mu_t \quad (14)$$

The coefficient of the log of change in exchange rate (LER) is interpreted to mean that the change in stock returns brought about by a percentage change in exchange rate holding all other factors constant is -0.381046. This further means that a 1 percent increase in exchange rate leads to a 0.00381046 (that is, 0.381046/100) unit decrease in stock returns.

The coefficient of the log of FDI means that the change in stock returns brought about by a percentage change in foreign direct investment holding all other factors constant is 0.466767. This further reflects that a 1 percent increase in FDI leads to a 0.00466767 (that is, 0.466767/100) unit increase in stock returns.

Test of Stability of the Error Correction Model

Pesaran (1997) argued that it is extremely important to ascertain the consistency of the long run multipliers by testing the error correction model for the stability of its parameters. Brown, Durbin, and Evans (1995) introduced the two commonly used tests for this purpose; the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMQ) in Figures 5 and 6.

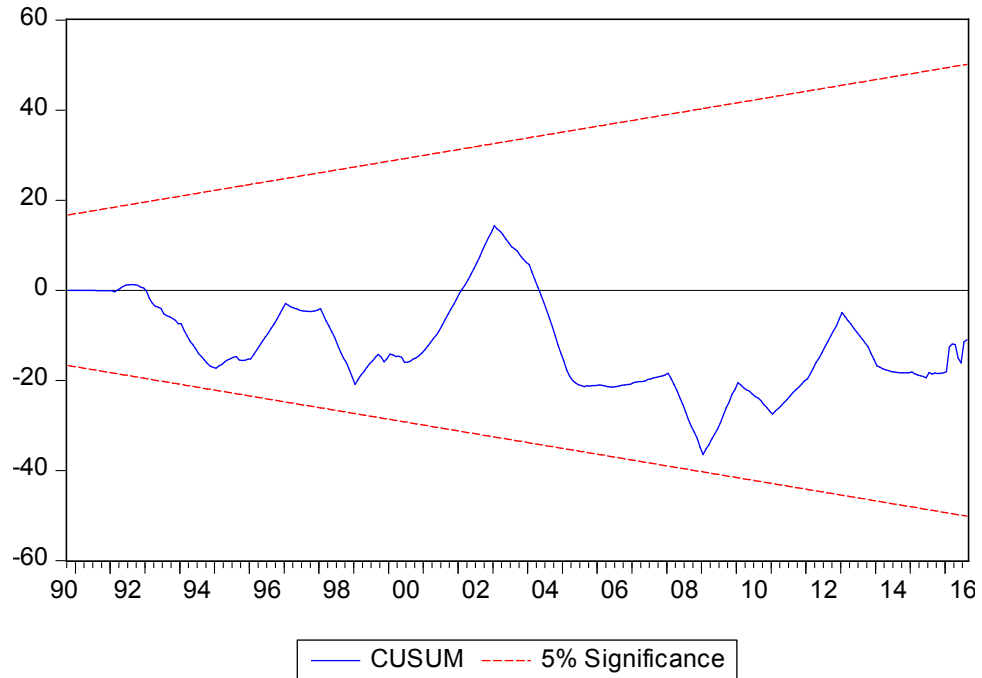


Figure 5: CUSUMQ stability test of ECM

Source: Field Survey, Andoh (2019)

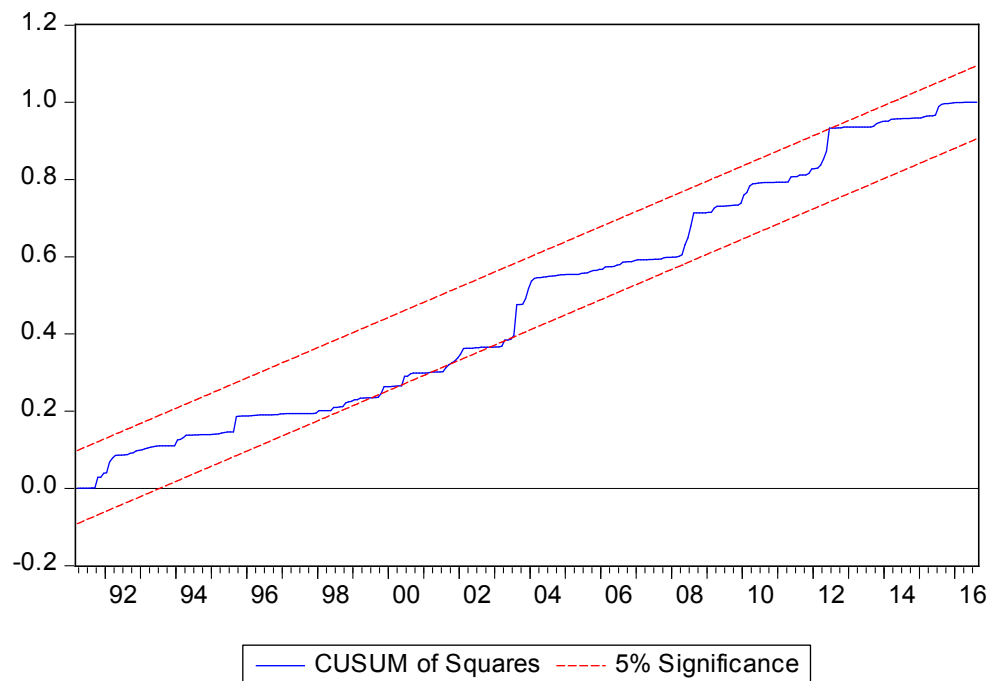


Figure 6: CUSUM of Squares stability test of ECM

Source: Field Survey, Andoh (2019)

As Figures 5 and 6 reflect, the ECM is stable over time since the thick dark line falls within the two dotted bounds. Therefore, the stability of the ECM is not questionable given that both the CUSUM and the CUSUMQ curves lie within the 95% confidence boundaries.

Test of Heteroscedasticity

The study tested for the assumption that the ECM has a constant variance (homoscedasticity). To this extent, the White test of heteroscedasticity was conducted at 5% sig level and under the following null and alternative hypothesis:

H_0 : The ECM has a constant variance (Homoscedasticity)

H_a : The ECM has no constant variance (Heteroscedasticity)

Table 7: White's test of heteroscedasticity

F-statistic	0.528809	Prob. F(35, 283)	0.9876
Obs*R-squared	19.58204	Prob. Chi-Square (35)	0.9835
Scaled explained SS	50.79348	Prob. Chi-Square (35)	0.0411

Source: Field Survey, Andoh (2019)

From the White's test of heteroscedasticity shown in Table 7, the probability value of the F-statistic is 0.9876 which is more than 5%. We therefore fail to reject the null hypothesis of homoscedasticity. In effect, the study concluded that there is constant variance in the error term of the ECM.

Effect of Financial Crises and Income Status on Stock Returns

The third objective of this study sought to test the moderating effect of the 2007/2008 financial crises and Ghana's lower middle income status on the relationship between petroleum prices and stock returns. To test for the moderating effect, we first observed the effect of financial crises (FC) and income status (IS) on the stock returns using Ordinary Least Square (OLS) regression. The result is displayed in Table 8.

Table 8: Multiple Linear Regression for Stock Returns

Dependent variable: SR

Method: Least square

Sample (adjusted): 1990M01 2017M12

Variable	Coefficient	Std. Error	t-Statistic	Probability
LM3	-0.560115	0.240814	-2.325923	0.0207
LPP	-0.036882	0.077701	-0.474667	0.6354
LIR	-0.010821	0.082048	-0.131889	0.8952
LGDS	0.012507	0.061460	0.203506	0.8389
LGPPC	-1.136020	1.041572	-1.090678	0.2763
LFDI	0.178859	0.048731	3.670317	0.0003
LCPI	0.036098	0.113611	0.317731	0.7509
LER	0.562524	0.143952	3.907712	0.0001
FC	0.128378	0.115339	1.113047	0.2666
IS	0.464618	0.142173	3.267968	0.0012

C	8.513817	6.180954	1.377428	0.1694
R-squared		0.866069	Mean dependent var.	0.295353
Adjusted R-square		0.839081	S.D. dependent var.	0.418678
S.E of regression		0.388474	Akaike info criterion	0.980588
F-statistic		6.153422	Durbin-Watson stat	2.026054
Prob (F-stattisitic)		0.00000		

Source: Field Survey, Andoh (2019)

Results displayed in Table 8 posit that petroleum price negatively affects stock returns but this effect is statistically insignificant. Other variables that statistically do not influence stock returns are interest rate, gross domestic savings, gross domestic product per capita, and consumer price index. On the other hand, the results conclude that money supply negatively influence stock returns. Variables which have a significant positive influence on stock returns are foreign direct investment and exchange rate. In addition, the results reflect that the 2007/2008 financial crises positively affected the stock returns but the extent of the influence is not statistically significant. The lower middle income status of Ghana was however found to have a significant positive influence on stock returns of Ghana.

The regression equation from Table 8 can therefore be estimated as indicated in equation 15.

$$\begin{aligned}
 SR_t = & -0.560114612964LM3_t - 0.036882291661LPP_t - 0.0108212134658LIR_t + \\
 & 0.012507356492LGDS_t - 1.13601985391LGDPPC_t + 0.178858781221LFDI_t + \\
 & 0.0360978265464LCPI_t + 0.562523646898LER_t + 0.128378117316FC_t + \\
 & 0.464618283079IS_t + 8.51381674287_t + \mu_t
 \end{aligned}
 \tag{15}$$

Using only significant variables, the final regression equation is thus estimated as shown in equation 16.

$$SR_t = -0.560114612964LM3_t + 0.178858781221LFDI_t + 0.562523646898LER_t + 0.464618283079IS_t + \mu_t \quad (16)$$

Goodness – of - Fit test

The results in Table 8 produced an R-square of 0.866 (86.6%). This means that only 13.4% of the variations in stock returns cannot be explained by the regressors in the regression model. In other words, 86.6% of the variations in the stock returns can be explained by the regressors put together. The study drew inferences about whether or not the R^2 is significantly different from zero using the F test of explanatory power under the null hypothesis that the R^2 is equal to zero. From Table 8, the probability of the F statistic of 6.153422 is 0.0000 which is less than the 5% significant level. Hence, we reject the null hypothesis that the R^2 is statistically zero.

Multicollinearity test

An implicit assumption of the classical linear regression model is that regressor variables are orthogonal to each other; that is to say that the explanatory variables are not correlated with one another. The study, therefore, tested for the degree of multicollinearity in the multiple regression model using the Variance Inflation Factor (VIF). As a precursor, we tested for the degree of multicollinearity with the decision of low multicollinearity if VIF is found to be less than 5. Table 9 depicts the results of the multicollinearity on the explanatory variables.

Table 9: Multicollinearity test

 Variance Inflation Factors

Sample: 1990M01 2017M12

Variable	Coefficient Variance	Centered VIF
LM3	0.057991	2.5036
LPP	0.006038	1.03475
LIR	0.006732	3.071200
LGDS	0.003777	4.29463
LGDPPC	1.084872	1.1097
LFDI	0.002375	4.14863
LCPI	0.012908	4.23333
LER	0.020722	3.21368
FC	0.013303	1.956971
IS	0.020213	1.036462
C	38.20419	-

Source: Field survey, Andoh (2019)

Considering the variables in Table 9, the VIF for each variable is less than 5 which is an indication that the model in Table 8 is free from multicollinearity.

Heteroscedasticity test

One of the major assumptions of the classical linear regression model is that the errors have a constant variance, and this is known as homoscedasticity. If there is no constant variance in the error term, the situation is termed as a heteroscedasticity.

The study used the White's test to underscore the presence or otherwise of heteroscedasticity in the residual of the model in Table 8 under the null hypothesis of homoscedasticity. The result of the test is displayed in Table 10.

Table 10: White test of heteroscedasticity

F-statistic	22.99101	Prob. F(60,259)	0.0802
Obs*R-square	256.4159	Prob. Chi-square (60)	0.5090
Scaled explained SS	260.6504	Prob. Chi-square (60)	0.5090

Source: Field Survey, Andoh (2019)

From Table 10, the probability of the F-statistic of 22.99101 is 8.02% which is more than the significant value of 5%. We therefore fail to reject the null hypothesis of homoscedasticity in the model in Table 8. Hence, we conclude that the error term of the model has a constant variance.

Autocorrelation test

According to the classical linear regression model assumption, autocorrelation is an undesirable property of the error. That is, the error at different time periods should have correlation; there has to be no discernible pattern. In other words, the errors should follow the random walk phenomenon. The study tested for whether or not there is the presence of autocorrelation in the model presented in Table 8. The null hypothesis under which the autocorrelation test was conducted is that there is no autocorrelation in the error term. The result of the Breusch-Godfrey (BG) autocorrelation test is displayed in Table 11.

Table 11: Breusch-Godfrey Serial Correlation LM Test

F-statistic	7306.653	Prob. F(2, 307)	0.3608
Obs*R-square	313.4157	Prob. Chi-Square (2)	0.2154

Source: Field Survey, Andoh (2019)

From the BG autocorrelation test shown in Table 11, the probability value of the F-statistic of 7306.653 is 0.3608 which is more than the 5% significant value. The study therefore failed to reject the null hypothesis of no autocorrelation in the error term and conclude that the error term follows no discernible pattern, hence there is no presence of autocorrelation. This test result is confirmed also by the value of the Durbin-Watson (DW) statistic in Table 8 of value 2.026054. A DW statistic of approximately 2 is an indication of no serial correlation.

Normality test

A popular test of normality is the Bera Jarque normality test. Bera and Jarque (1981) formalized the ideas of the moments of a distribution by testing the residuals for normality by testing whether the coefficient of skewness and the coefficient of excess kurtosis are jointly zero. The Jarque Bera has a χ^2 distribution with 2 degrees of freedom under the null hypothesis of normally distributed errors. If the residuals are normally distributed, the histogram should be a bell-shaped and the JB statistic would not be significant. Making the residual series from output in Table 8, we arrived at the output in Figure 7.

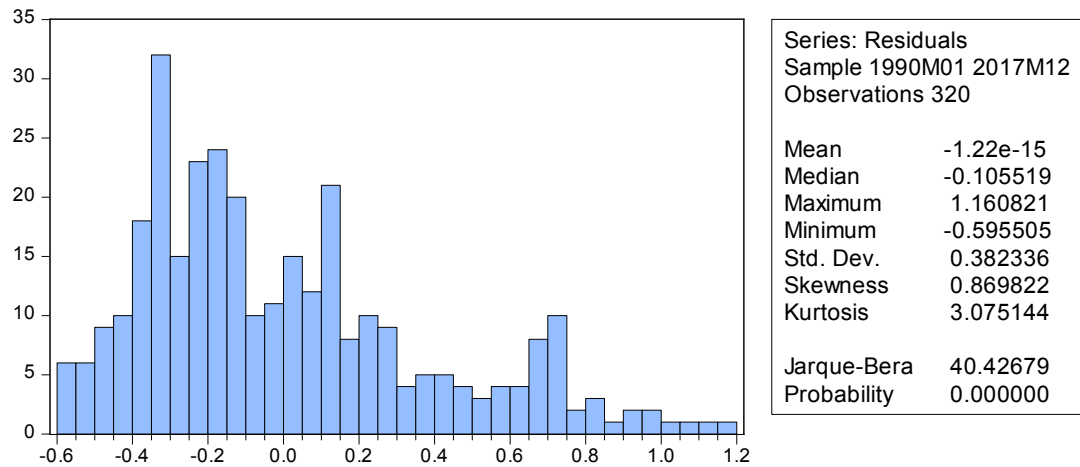


Figure 7: Jarque Bera Normality test

Source: Field Survey, Andoh (2019)

From Figure 10, first we observe that the mean value of $-1.22e-15$ is essentially zero. However, qualitatively the histogram of the residuals portrays asymmetry which is confirmed by the Jarque-Bera (JB) test of normality. A JB statistic of 40.42679 with a p-value of zero fails to accept the null hypothesis. Thus, the error term does not follow the normal distribution. Since there is no consensus as to how to remedy the normality situation, we proceed with the results obtained.

Moderating Role of Financial Crises and Income Status

The study examined the mediating role of the 2007/2008 financial crises and Ghana's income status on the relationship between petroleum prices and stock returns. This examination was carried out by interacting the financial crises (FC) and income status (IS) dummy variables with petroleum price and the analysis was undertaken by using multiple regression. The result is displayed in Table 12.

The estimated regression equation is stated as indicated in equation 15.

$$D(SR_t) = \beta_1 D(LM3_t) + \beta_2 D(LPP_t) + \beta_3 D(LIR_t) + \beta_4 D(LGDS_t) + \beta_5 D(LGDPPC_t) + \beta_6 D(LFDI_t) + \beta_7 D(LCPI_t) + \beta_8 D(LER_t) + \beta_9 FC_t + \beta_{10} IS_t + \beta_{11} FC * D(LPP)_t + \beta_{21} IS * D(LPP)_t + C + \mu_t \quad (17)$$

Table 12: Multiple Linear Regression for Stock Returns

Dependent Variable: D(SR)				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LM3)	0.056002	0.092070	0.608260	0.5435
D(LPP)	-0.037943	0.035832	-1.058914	0.2905
D(LFDI)	0.458069	0.056459	8.113241	0.0000
D(LCPI)	0.014704	0.022139	0.664158	0.5071
D(LGDS)	0.030940	0.042979	0.719878	0.4721
D(LER)	-0.308665	0.123216	-2.505084	0.0128
D(LGDPPC)	5.945726	1.884954	3.154308	0.0018
D(LIR)	0.023837	0.047936	0.497271	0.6194
FC	-0.038448	0.011058	-3.476906	0.0006
IS	-0.010795	0.008076	-1.336801	0.1823
D(LPP)*IS	-0.090747	0.073201	-1.239695	0.2160
D(LPP)*FC	0.026669	0.088927	0.299903	0.7645
C	-0.019700	0.005817	-3.386390	0.0008
R-squared	0.233717	Mean dependent var		0.001495
Adjusted R-squared	0.203666	S.D. dependent var		0.055963
S.E. of regression	0.049940	Akaike info criterion		3.116097
F-statistic	7.777505	Durbin-Watson stat		2.092835
Prob(F-statistic)	0.000000			

Source: Field Survey, Andoh (2019)

The regression equation based on significant variables is stated in equation 18.

$$SR = 0.458D(LFDI) - 0.308D(LER) + 5.945D(LGDPPC) - 0.0384FC + \mu_t \quad (18)$$

From equation 18, changes in gross domestic product per capita and changes in foreign direct investment positively influence changes stock returns whereas changes in exchange rate and financial crises negatively influence changes in stock market returns. The negative influence of financial crises means that the 2007/2008 financial crises negatively influenced changes in stock returns by approximately 4%. However, the interactive dummies with petroleum price did not indicate any significant effect on changes in stock market returns.

Regression diagnostics

The model in Table 12, shows an R-square of 0.233, which is an indication that all the regressors jointly explains up to 23.3% of the variations in stock returns which is the dependent variable. This further means that 76.7% of the variation in the dependent variable cannot be explained by all the independent variables jointly. To test whether the magnitude of the R-square is enough for the model, we observe the probability value of the F-statistic in Table 12. The probability value of the F-statistic of value 7.777 is 0.0000 which is statistically significant. By extension, the study concluded that the coefficients of the regressors are jointly not zero. Thus, the R-square for the model is statistically large enough to explain how the regressors jointly explain stock returns.

Table 12 also reveals a Durbin Watson statistic of 2.09 which is an indication that there is an absence of serial correlation in the model presented in Table 12 and equation 18. The study diagnosed for the presence or otherwise of heteroscedasticity

in the model presented in Table 12. From the heteroscedasticity table presented in the appendix of this work, the probability of the F-statistic of 5.501223 is 56% which is more than the significant value of 5%. We therefore fail to reject the null hypothesis of homoscedasticity in the model in Table 12. Hence, we conclude that the error term of the model has a constant variance. The CUSUM test presented in the appendix B of this work indicates that the model presented in Table 12 is stable over the sample period.

Discussion of results

From Table 1 (in Appendix C), the ARDL results revealed that the first lag up to the seventh lag of stock returns help in explaining the variations in the current stock returns. However, whereas the first, fifth, and seventh period lags of stock returns positively and significantly influence the current level of stock returns, the second and the sixth lags of stock returns negatively and significantly affect the current level of stock returns. The third and fourth lags of stock returns do not significantly influence the current level of stock returns. This results stems from the indication that the stock market returns are highly volatile and that a mixture of both positive and negative returns are recorded from one period to the other. Hence, investors must carefully consider the immediate past seven months returns when making investment on the stock exchange of Ghana.

The results also reflected that current level of petroleum price negatively influence stock returns but the size of the effect is statistically insignificant. The insignificant nature of the influence could largely stem from the fact that the Ghana

Stock Exchange is largely dominated by financial institutions as opposed to few manufacturing and oil companies. Hence, petroleum price dynamics is not a major determinant of stock returns.

The ARDL results showed clearly that current level of interest rate, consumer price index and money supply influence the current level of stock returns. The sizes of the influence were however found to be statistically insignificant. Despite being insignificant, interest rate and consumer price index have positive influence on stock returns whereas money supply has negative influence on stock returns. This result is consistent with the study conducted by Chinzara (2010), Xiufang-Wang (2010), and Adaramola (2011).

The current level of exchange rate, the first and second lags were observed to have a significant influence on stock returns. Exchange rate at levels and its second lag were seen to have negative impact on stock returns whereas the first lag was observed to have a positive impact on stock returns. Similarly, foreign direct investment (FDI) at level, its first and second lags significantly affects the current level of stock returns. As current level and the second lags of FDI positively influence stock returns, the first lag of FDI negatively affect stock returns.

In the short run, from Table 6, changes in exchange rate and foreign direct investment significantly influence the changes of stock returns. Whereas changes in exchange rate negatively affect changes in stock returns, changes in foreign direct investment positively influence changes in stock returns. In the short run, changes in petroleum price, interest rate, consumer price index, and money supply do not

statistically influence changes in stock return. Even though petroleum price does not influence stock returns, the impact it has on stock returns is negative.

The results from Table 5 showed also a long run relationship between stock returns and macroeconomic variables. In the long run, exchange rate and foreign direct investment significantly and positively influence stock returns whereas money supply negatively and significantly influence stock returns. Increase in Money Supply will increase inflation, which will again increase expected rate of return. Use of high expected rate of return will decrease value of the firm and will result in lower share prices, thereby reducing stock returns. This result is consistent with that of Ahmed (2008) who employed Toda – Yamamoto Granger causality test and the Johansen's approach of co-integration to study the relationship between the macroeconomic variables and stock returns in India by using quarterly data for the period from March, 1995 to March 2007 and found a long-run association between stock returns and index of industrial production, money supply, FDI.

With respect to exchange rate behaviour, a depreciation of the domestic currency against foreign currencies increases export, therefore, in line with the results obtained, exchange rate has a negative relationship with the stock return at least in the short run. But, at the same time, depreciation of domestic currency increases the cost of imports which indicates a positive relationship with stock returns as the results confirmed in the long run. Hence, the relationship between exchange rate and stock returns needs to be checked.

Similarly, our results agree with that of Kyereboah-Coleman and Agyire-Tettey (2008) who examined the relationship between macroeconomic indicators,

economic growth and stock market performance in Ghana between the first quarters of 1991 to the last quarters of 2005 of which they used the All Shares Index as a representation for stock market performance. The results showed that exchange rate has a positive influence on the stock market performance. This shows that the market will benefit with the depreciation of the Cedi through receiving the proceeds from their sale on the international market. Petroleum price, interest rate and consumer price index do not exert any significant influence on stock returns.

Rahman, et al. (2009) studied the association between stock prices and selected macroeconomic variables in Malaysia using monthly data from January 1986 to March 2008. They employed VECM/VAR framework. They showed that changes in Malaysia stock market index do perform a cointegrating relationship between changes in interest rate, money supply, reserves, industrial production index and exchange rate. The findings stressed that industrial production index, interest rates, and reserves were positively related while exchange rate and money supply were negatively related to Malaysian stock market return in the long-run. The study of Rahman et al. (2009) in part confirms this incumbent study where interest rates positively relates to stock returns both in the short run and the long run.

Maku and Atanda (2010) examined the long-run and short-run macroeconomic shocks effect on the Nigerian capital market between 1984 and 2007. They studied the properties of the time series variables using the Augmented Dickey-Fuller (ADF) test and Error Correction Model (ECM). The empirical analysis indicated that the Nigeria Stock Exchange All Share Index is more responsive to changes in the inflation rate, exchange rate, and money supply and real

output. Therefore, all the incorporated variables that serve as proxies for external shock and other macroeconomic indicators have simultaneous significant shock in the Nigerian capital market both in the long run and short-run. The results of this study is reflective of the situation in Ghana where following this studies, exchange rate, money supply and foreign direct investment affect stock returns both in the short run and long run.

Chapter Summary

In summary, the study can submit that are both short run and long run relationship between stock market returns and petroleum price and other macroeconomic factors. It was also observed that income status and financial crises do not moderate the relationship between stock returns and petroleum price in Ghana.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This study focused on investigating the effect of petroleum price on stock returns of Ghana by using monthly data from 1990 to 2017. The researcher, therefore, investigated whether there is both short run and long run relationship between stock returns and petroleum price. The study was augmented with other control variables which were consumer price index, foreign direct investment, economic growth rate, interest rate, gross domestic savings and money supply. Furthermore, the researcher used the multiple regression model to test the effect of financial crises and Ghana's lower middle income status on stock returns. Lastly, the interactive terms were employed in the regression model to ascertain the moderating role of financial crises and income status.

The overall purpose of the study was to assess the impact of petroleum price on stock returns. The key research questions which guided the study were; is there any short run or long run relationship between petroleum price and stock returns? Is there any causality between and among the macroeconomic indicators? Does financial crises and income status affect the stock returns of Ghana? Does financial crises and income status moderate the relationship between petroleum price and stock returns? The study adopted the quantitative approach as the research method. The study employed the ARDL and bounds testing as well as the multiple regression model in analysing the data.

Summary of key findings

One of the key findings of this study is that there is both a short run and a long run relationship between petroleum price and stock returns with a speed of adjustment towards long run equilibrium of 2%. It was observed that petroleum price negatively affect stock returns though the magnitude of the effect was statistically not significant. Exchange rate was observed to have both negative and positive influence on stock returns in the long run and short run respectively. Money supply in the long run will exert an indirect effect on stock returns. Foreign direct investment does significantly affect the stock returns of Ghana. Interest rate and consumer price index were observed to have positive influence on stock returns but the effect were statistically insignificant.

Finally, the study revealed that financial crises influenced stock returns significantly as well as income status does. But, the moderating role the two categorical variables are statistically significant in changing the direction of influence of some variables on stock returns.

Conclusions

Following the investigations undertaken from this study, some important conclusions can be made. One of the conclusions is that there exists a long run co-integrating relationship between petroleum price and stock returns at the equilibrating speed of adjustment of 2% per month. This means that it will take as long as fifty months for the whole system or the market to converge at long run equilibrium after the deviation in the short run.

The second important conclusion observed from this study is that financial crises at the global level statistically do affect the stock returns of Ghana. This could stem from the fact the stock market of Ghana and the level of foreign investment in it is high to receive shocks following any bubble in the global economy. The lower middle income status of Ghana was seen to have a significant positive influence on stock returns.

Fourthly, we conclude that in the long run, exchange rate money supply and foreign direct investment are the main drivers of stock whereas in the short run the main drivers of stock returns are exchange rate and foreign direct investment. Fifthly, the ARDL output reflects that the first to the seventh lags of stock returns do affect the current level of stock returns; the current level to the second lags of exchange rate and foreign direct investment do also affect the current level stock returns.

Recommendations

Based on the results and conclusions reached, the following recommendations are worthy to be noted for policy implication and directions.

Firstly, since petroleum does not significantly affect stock market returns in Ghana, but other macroeconomic variables such as exchange rate and foreign direct investment do, the study recommends that the government pays attention to strengthening the macroeconomic factors to boost the growth of the capital market in Ghana. Secondly, the study also found both income status and financial crises to be of significance in affecting stock market returns. The study therefore recommends

the government of Ghana to put in measures to achieve higher income status since the middle income status increases stock market performance.

Suggestion for future research

It should, however, be stressed that the results of this study are limited by the ARDL framework and only five selected macroeconomic variables. Future research should test for the robustness of these results within a larger ARDL system and including more variables with a longer period to improve the results. Future research may also consider narrowing the discussion to the extractive and the manufacturing sectors since such firms directly use petroleum products as their source of inputs.

References

- Aaron, A. (2016). Oil price shock and emerging stock markets: A Generalized VAR Approach. *International Journal of Applied Econometrics and Quantitative Studies*, 1(4), 27-40.
- Aarón, G., & Sherzod, N. (2016). *Oil price fluctuations and its effect on GDP growth: A case study of USA and Sweden*. Jonkoping International Business School, Jonkoping University. Unpublished PHD thesis.
- Adam, A.M. & Tweneboah, G. (2008). *Do macroeconomic variables play any role in the stock market movement in Ghana?* MPRA paper no. 9301.
- Adaramola, A. (2011). The impact of external shocks on South African inflation at different price stages. *Journal for Studies in Economics and Econometrics*, 30(1), 1-22.
- Adjasi, C. K. (2009). Macroeconomic uncertainty and conditional stock-price volatility in frontier African markets: Evidence from Ghana. *The Journal of Risk Finance*, 10(4), 333-349.
- Ahmed, S. (2008). Aggregate Economic Variables and Stock Markets in India. *International Research Journal of Finance and Economics*, 5(14), 33-42
- Altay, E. (2003). The effect of macroeconomic factors on asset returns: a comparative analysis of the German and the Turkish Stock Markets in an APT Framework, *Martin-Luther-Universität Halle Journal*, 10(9), 13-17.
- Anadarko Petroleum Corporation (2017). Anadarko Main Page. Retrieved from <http://www.anadarko.com/Home/Pages/Home.aspx>, checked on 03/09/2017.

- Anokye, M. A., & Tweneboah, G. (2008). *Macroeconomic Factors and Stock Market Movement: Evidence from Ghana*. MPRA Paper No.11256, Munich, Munich Personal RePEc Archives.
- Arouri, J., Lahiani, R., & Nguyen, A. (2011). Oil price shocks and stock markets in the U.S. and 13 European countries. *Energy Economics*, 30(5), 2587-2608.
- Pesaran, M. H. (1991). *Interactive econometric analysis of Macroeconomic Variables*. Oxford: Oxford University Press.
- Arouri, M. E. H., Lahiani, A., & Nguyen, D. K. (2011). Return and volatility transmission between world oil prices and stock markets of the GCC countries. *Journal of Economic Modelling*, 28(4), 1815-1825.
- Arouri, M.E.H., & Rault, C.(2012). Oil prices and stock markets: What drives what in the Gulf Corporation Council Countries. *Economie Internationale*, 2(19), 41-56.
- Badarudina, Z. E., Ariffb, M. & Khalid, A.M. (2011). Money supply endogeneity and Bank stock returns. *Applied Financial Economics*, 20(21), 1035–1048.
- Barnor, C. (2014). The Effect of Macroeconomic Variables on Stock Market Returns in Ghana (2000-2013). *Walden University Scholar Journal*, 12(32), 181-224. Retrieved from <http://scholarworks.waldenu.edu>
- Barrows, W. C., & Naka, A. (1994). Use of macroeconomic variables to evaluate selected hospitality stock returns in the U.S. *International Journal of Hospitality Management*, 13(2), 119-128.

- BBC NEWS (2007). UK's Tullow uncovers oil in Ghana. Retrieved from <http://news.bbc.co.uk/2/hi/business/6764549.stm>, on 3/09/2017.
- Beenstock, M., & Chan, K.F. (1988). Economic forces in London Stock Market. *Oxford Bulletin of Economics and Statistics*, 50(5), 22-39.
- Bera, H. & Jarque, R. (1981). Normality Test: Econometrics Approach. Cambridge: Harvard University Press.
- Berk, J. & Aydoganb, R. (2012). Crude oil price shocks and stock returns: evidence from Turkish Stock Market under Global Liquidity Conditions. *JEL Classification Journal*, 58(15), 43-47.
- Bilson, C. M., Brailsford, T. J., & Hooper, V. J. (2001). Selecting macroeconomic Variables as Explanatory Factors of Emerging Stock Market Returns. *Pacific-Basin Finance Journal*, 9(4), 401–426. <http://dx.doi.org>
- Birău, R. (2013). The implications of catastrophe theory for stock market forecasting. *ARPJN Journal of Science and Technology*, 2(5), 360–363.
- Black, F., Jensen, M. C., & Scholes, M. (1972). The capital asset pricing model: Some Empirical Tests, in *Studies in the Theory of Capital Markets*. New York: Praeger, 79–121.
- Bloomberg.com. *Online subscription data source*. 2017.
- Brooks, R. (2008). Stock Returns, Interest Rate and the Direction of Causality. *Journal of Finance*, .35(7), 1073-1103.

- Brown, R. L., Durbin, J., & Evans, M. (1995). Techniques for testing the constancy of regression relations over time. *Journal of the Royal Statistical Society*, 37(2), 149–192.
- Cagnetti, A. (2002). Capital Asset Pricing Model and Arbitrage Pricing Theory in the Italian Stock Market: An Empirical Study. *School of Management, University of Edinburgh, Working Paper No.CFMR 02.01*.
<http://dx.doi.org/1842/1821>
- Cantore, I., Antinmiani, O., & Anciaes, E. (2012). The Relationship between Macroeconomic Variables and Stock Market Index in Nigeria. *Journal of Economics*, 3(1), 55-63.
- Chen, N. F., Roll, R., & Ross, S. A. (1986). Economic Forces and Stock Market. *Journal of Business*, 59(14), 383-404.
- Chen, Q., & Lv, X. (2015). The extreme-value dependence between the crude oil price and Chinese stock markets. *International Review of Economics & Finance*, 39(17), 121-132.
- Chinzara, A. (2010). The stochastic behaviour of common stock variances: values leverage and interest rate effects. *Journal of Financial Economics*, 9(10), 15 - 36.
- Cong, R.G., Wei, J. L., Jiao, P. & Fan, Y. (2008). Relationships between oil price shocks and stock market: an empirical analysis from China. *Energy Policy Journal*, 59(10): 383-403.

- Duran, R., Lorenzo, A., & Armenta, L. (2011). The impact of oil fluctuations on stock returns and their volatility in Latin American stock markets. *Proceedings of the XVI Congreso Internacional de Contaduría, Administración e Informática (ANFECA)*.
- El-Sharif, I., Brown, D., Burton, B., Nixon, B., & Russell, A. (2005). Evidence on the nature and extent of the relationship between oil prices and equity values in the UK. *Energy Economics*, 27(6), 819 - 830.
- Fama, E. F., & French, K. R. (1994). The Cross-Section of Expected Stock Returns. *Journal of Finance*, 47(2), 427-65.
- Fifield, S. G. M., Power, D. M., & Sinclair, C. D. (2002). Macroeconomic Factors and Share Returns: An Analysis using Emerging Market Data. *International Journal of Finance and Economics*, 33(1), 51-62.
- Filis, G., Degiannakis, S. & Floros, C. (2011). Dynamic correlation between stock market and oil prices: The case of oil-importing and oil-exporting countries. *International Review of Financial Analysis*, 40(20), 152-164.
- Fisher, I. (1930). *Theory of interest rates*. New York: MacMillan.
- Garcia, F. V. & Liu, L. (1999). Macroeconomic determinants of stock market development. *Journal of Applied Economics*, 2(1), 29-59.
- Ghana Oil Watch (2011). A study of Ghana's oil and gas industry local (Ghanaian) content policy process. Retrieved from 10.13140/rg. on 10th September 2017.

Ghana Stock Exchange (2016). Annual Report, Accra – Ghana. Retrieved from www.gse.com.

Ghanaweb.com (2009). Fight for Ghana's oil: Exxon vs China. Retrieved from <http://www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel.php?ID=170209>, on 3/09/2017.

Gisser, M. & Goodwin, T. H. (1985). Crude oil and the macroeconomy: Tests of some popular notions: *Journal of Money, Credit, and Banking*, 18(12) 95-103.

Goodness, C. A. (2015). Does oil price uncertainty matter for stock returns in South Africa? *Investment Management and Financial Innovations Journal*, 12(1), 99-105.

Goodwin, H. (1985). Oil price changes and its economic and social reactionary effect: An appraisal. *Switz Journal of Social Economics*, 4(2), 50-53.

Groenewold, N., & Fraser, P. (1997). Share prices and macroeconomic factors. *Journal of Business Finance and Accounting*, 9(10), 1367–1383.

Ghana Stock Exchange (2017). Annual Report, Accra: Ghana.

Hamilton, J.D. (1983). Oil and the macroeconomy since World War II. *Journal of Political Economy*, 91(2): 228-248.

Haruna, A. (2013). Econometric issues in the analysis of regressions with generated regressors. *International Economic Review*, 25(18), 221-247.

Hasanzadeh, A., & Kianvand, M. (2012). The impact of macroeconomic variables on stock prices: the case of Tehran Stock Exchange. *Money and Economy*, 6(2), 59-72.

- Hill, R. A. (2010). Portfolio theory and financial analyses. *Robert Allan Hill & Ventus Publishing ApS*.
- Hooker, A.M. (2002). Are oil shocks inflationary? Asymmetric and nonlinear specifications versus changes in regime. *Journal of Money, Credit and Banking*, 34(2), 540-561.
- Hooker, M.A. (1986). What happened to the oil price-macroeconomy relationship? *Journal of Monetary Economics*, 38(23), 195-213.
- Islam, M. J., de Groot, H.L.F. & Florax, R.J.G.M. (2013). 'Capital-energy Substitution and Shifts in Factor Demand: A Meta-analysis'. *Energy Economics* 30(12), 36–51.
- Issahaku, H., Ustarz, Y., & Domanban, B.P. (2013). Macroeconomic variables and stock market returns in Ghana. Any causal link? *Asian Economic and Financial Review*. 3(8), 1044-1062.
- Kapusuzoglu, A. (2011). Relationships between oil price and stock market: An empirical analysis from Istanbul Stock Exchange (ISE). *International Journal of Economics and Finance*, 3(6), 99.
- Kasa, K. (1992). Common stochastic trends in international stock markets. *Journal of Monetary Economics*, 29(1), 95–124.
- Kuwornu, J. K. M., & Owusu-Nantwi, V. (2011). Macroeconomic variables and stock market returns: full information maximum likelihood estimation. *Research Journal in Finance and Accounting*, 2(4), 49 – 63.

- Kuwornu, L. & Victor, A. (2011). Volatility spillovers between stock returns and exchange rate changes. *Journal of Business Finance and Accounting*, 27(2), 448-468.
- Kuwornu, L. (2011). Not all oil price shocks are alike: Disentangling demand and supply shocks in the crude oil market. *American Economic Review*, 99(6), 1053-1069.
- Kyereboah-Coleman, A., & Agyire-Tettey, K. F. (2008). Impact of macroeconomic indicators on stock market performance: The case of the Ghana stock exchange. *Journal of Risk Finance*, 5(2), 89-108.
- Laser, R. A. (1987). Stock return, volatility and the global financial crisis in an emerging market: The Nigerian case. *International Review of Business Research Papers*, 5(4), 426-447.
- Lin, T., Presley, M. & Appiah, C. (2014). The macroeconomic effects of oil price fluctuations on a small open oil-producing country: The case of Trinidad and Tobago. *Energy Policy* 37(7): 2708–2716.
- Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *Review of Economics and Statistics*, 47(1), 13–37.
- Lui T. & Garcia, M. (1999). The stock market and exchange rate dynamics. *Journal of International Money and Finance*, 8(2), 181-200.

- Maghyereh, A., & Al-Kandari, A. (2007). Oil prices and stock markets in GCC countries: new evidence from nonlinear cointegration analysis. *Managerial Finance*, 33(7), 449-460.
- Mahotra, H. (2015). Oil and the macroeconomy since the 1970s. *Journal of Economic Perspectives*, 18(23), 115-134.
- Maku, O. E., & Atanda, A. A. (2010). determinants of stock market performance in nigeria: long run analysis. *Journal of Management and Organizational Behaviour*, 1(3), 1-16.
- Malik, F., & Ewing, B. T. (2009). Volatility transmission between oil prices and equity sector returns. *International Review of Financial Analysis*, 18(3), 95-100.
- Mano, J. S. (2018). The 2007-08 Financial Crisis in Review. Retrieved from <https://www.investopedia.com/articles/economics/09/financial-crisis-review.asp> on 22nd March 2019.
- Miller, J. I. & Ratti, R. A. (2009). Crude oil and stock markets: stability, instability, and bubbles. *Energy Economics*, 31(12), 559-568.
- Muhammad, V. (2013). Oil prices and economic activity: an asymmetric cointegration approach, *Energy Economics*, 34(1), 3910-3915.
- Mukherjee, T. K. & Naka, A. (1995). Dynamic relations between macroeconomic variables and the Japanese stock market: an application of vector error correction model. *The Journal of Financial Research*, 18(2), 223-237.

- Narayan, P. K., & Narayan, S. (2010). Modelling the impact of oil prices on Vietnam's stock prices. *Applied Energy*, 87(1): 356-361.
- Osisanwo, B. G., & Atanda, A. A. (2012). Determinants of stock market returns in Nigeria: a time series analysis. *African Journal of Scientific Research*, 9(1), 231-243.
- Owusu, P. & Anokye, M. (2016). *Financial modeling: an example based handbook*.
- Ozcam, M., (1997). An Analysis of the Macroeconomic Factors That Determine Stock Return in Turkey, *Capital Market Board of Turkey, Publication Number 75*.
- Papapetrou, E. (2001). Oil price shocks, stock market, economic activity and employment in Greece. *Energy Economics*, 23(5), 511-532.
- Park, J., & Ratti, R. A. (2008). Oil price shocks and stock markets in the U.S. and 13 European countries. *Energy Economics*, 30(5), 2587-2608.
- Nkoro, E., & Uko, A. K. (2013). A generalized autoregressive conditional heteroskedasticity model of the impact of macroeconomic factors on stock returns: empirical evidence from the Nigerian stock market. *International Journal of Financial Research*, 4(4), 38.
- Pebbles, G., & Wilson, P. (1996). *The Singapore Economy*. Cheltenham, UK: Edward Elgar.
- Pesaran, H. H., & Shin, Y. (1998). Generalized impulse response analysis in linear multivariate models. *Economics Letters Elsevier*. 58(1), 17-29.

- Pesaran, M. H., & Pesaran, B. (1997). *Working with microfit 4.0: Interactive econometric analysis*. Oxford: Oxford University Press.
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2002). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*, 16(1), 289-326.
- Public Interest and Accountability Committee (2016). Annual Report, Accra: Ghana. retrieved from www.piac.com.gh
- Rahman, B., Wesseh Jr., P. K. & Appiah, M. O. (2009). Oil price fluctuation, volatility spillover and the Ghanaian equity market: Implication for portfolio management and hedging effectiveness. *Energy Economics*, 42(13), 172-182.
- Ross, S.A. (1976). The Arbitrage Pricing Theory of Capital Assets Pricing. *Journal of Economic Theory*, 13(27), 341-360.
- Sakyi, K. A. (2011). The Import of Middle Income Status for Ghana. Retrieved from <https://www.ghanaweb.com/GhanaHomePage/features/The-Import-of-Middle-Income-Status-For-Ghana-214836> 22nd March 2019.
- Sharpe, W. F. (1964). Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. *Journal of Finance*, 19(14), 425-442.
- Singh A. (1997). Financial liberalization, stock markets and economic development. *Economics Journal* 107(16), 771-782.

- Swanepoel, J. A. (2006). The impact of external shocks on South African inflation at different price stages. *Journal for Studies in Economics and Econometrics*, 30(1), 1-22.
- Tullow Oil (2012). Tullow Oil Ghana. Retrieved from <http://www.tulloil.com>
- Valdes, A. L., Fraire, L. A., & Vasquez, R. D. (2016). A copula-tgarch approach of conditional dependence between oil price and stock market index: the case of Mexico. *Estudios Economicos*, 31(1), 23-56.
- Williams, B. J. (1938). *The theory of investment value*. Cambridge: Harvard University Press.
- Wongbangpo, P., & Sharma, S. C. (2002). Stock market and macroeconomic fundamental dynamic interactions: ASEAN-5 Countries. *Journal of Asian Economics*, 13(1), 27-51.
- Xiufang-Wang, A. (2010). Volatility spillovers between stock returns and exchange rate changes. *Journal of Business Finance and Accounting*, 27(12), 448-468.
- Yartey, A. C. (2008). *The Determinants of stock market development in Emerging Economies: Is South Africa Different*. IMF Working Paper, WP/08/32

Appendix A: Unit Root Tests

Null Hypothesis: SR has a unit root

Exogenous: Constant

Lag Length: 13 (Automatic - based on AIC, maxlag=16)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.958382	0.0019
Test critical values: 1% level	-3.451491	
5% level	-2.870743	
10% level	-2.571744	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LCPI) has a unit root

Exogenous: Constant

Lag Length: 14 (Automatic - based on AIC, maxlag=16)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.166556	0.0009
Test critical values: 1% level	-3.451632	
5% level	-2.870805	
10% level	-2.571777	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LER) has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic - based on AIC, maxlag=16)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.256207	0.0000
Test critical values: 1% level	-3.450747	
5% level	-2.870416	
10% level	-2.571569	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LFDI) has a unit root

Exogenous n: Constant

Lag Length: 1 (Automatic - based on AIC, maxlag=16)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.548942	0.0000
Test critical values: 1% level	-3.450682	
5% level	-2.870387	
10% level	-2.571554	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LCPI) has a unit root

Exogenous: Constant

Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-24.78747	0.0000
Test critical values: 1% level	-3.450682	
5% level	-2.870387	
10% level	-2.571554	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LER) has a unit root

Exogenous: Constant

Bandwidth: 12 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-17.65492	0.0000
Test critical values: 1% level	-3.450617	
5% level	-2.870359	
10% level	-2.571538	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LFDI) has a unit root

Exogenous: Constant

Bandwidth: 9 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-8.962684	0.0000
Test critical values: 1% level	-3.450617	
5% level	-2.870359	
10% level	-2.571538	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LIR) has a unit root

Exogenous: Constant

Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-10.91863	0.0000
Test critical values: 1% level	-3.450617	
5% level	-2.870359	
10% level	-2.571538	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LM3) has a unit root

Exogenous: Constant

Bandwidth: 15 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-18.42774	0.0000
Test critical values: 1% level	-3.450747	
5% level	-2.870416	
10% level	-2.571569	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LPP) has a unit root

Exogenous: Constant

Bandwidth: 12 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-14.11617	0.0000
Test critical values: 1% level	-3.450617	
5% level	-2.870359	
10% level	-2.571538	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: SR has a unit root

Exogenous: Constant

Bandwidth: 13 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-3.194806	0.0212
Test critical values: 1% level	-3.450617	
5% level	-2.870359	
10% level	-2.571538	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LCPI is stationary

Exogenous: Constant

Bandwidth: 15 (Newey-West automatic) using Bartlett kernel

	LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic	1.847322
Asymptotic critical values*: 1% level	0.739000
5% level	0.463000
10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Null Hypothesis: LER is stationary

Exogenous: Constant

Bandwidth: 15 (Newey-West automatic) using Bartlett kernel

	LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic	1.987406
Asymptotic critical values*:	
1% level	0.739000
5% level	0.463000
10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Null Hypothesis: LFDI is stationary

Exogenous: Constant

Bandwidth: 15 (Newey-West automatic) using Bartlett kernel

	LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic	2.052377
Asymptotic critical values*:	
1% level	0.739000
5% level	0.463000
10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Null Hypothesis: LIR is stationary

Exogenous: Constant

Bandwidth: 15 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.858754
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Null Hypothesis: LM3 is stationary

Exogenous: Constant

Bandwidth: 15 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		2.094497
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Null Hypothesis: LPP is stationary

Exogenous: Constant

Bandwidth: 15 (Newey-West automatic) using Bartlett kernel

	LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic	2.070179
Asymptotic critical values*:	
1% level	0.739000
5% level	0.463000
10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Null Hypothesis: SR is stationary

Exogenous: Constant

Bandwidth: 14 (Newey-West automatic) using Bartlett kernel

	LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic	0.184927
Asymptotic critical values*:	
1% level	0.739000
5% level	0.463000
10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Appendix B: OLS Diagnostics**Table 1: Variance Inflation Factor**

Variable	Coefficient Variance	Centered VIF
LM3	0.084615	1.121
LPP	0.010674	3.6992
LIR	0.006987	4.900319
LGDS	0.007775	4.1586
LGDPPC	4.411444	2.0315
LFDI	0.001859	3.13431
LCPI	0.094687	5.3641
LER	0.049575	3.3805
FC	378409.0	4.1627
IS	9786.953	5.1555.
LPP*IS	0.044342	2.4705
LPP*FC	0.785673	1.286422
C	165.6932	NA

Table 2: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1236.952	Prob. F(2,291)	0.0720
Obs*R-squared	286.3207	Prob. Chi-Square(2)	0.0790

Table 3: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	5.501223	Prob. F(26,293)	0.5600
Obs*R-squared	104.9698	Prob. Chi-Square(26)	0.2800
Scaled explained SS	138.5175	Prob. Chi-Square(26)	0.2800

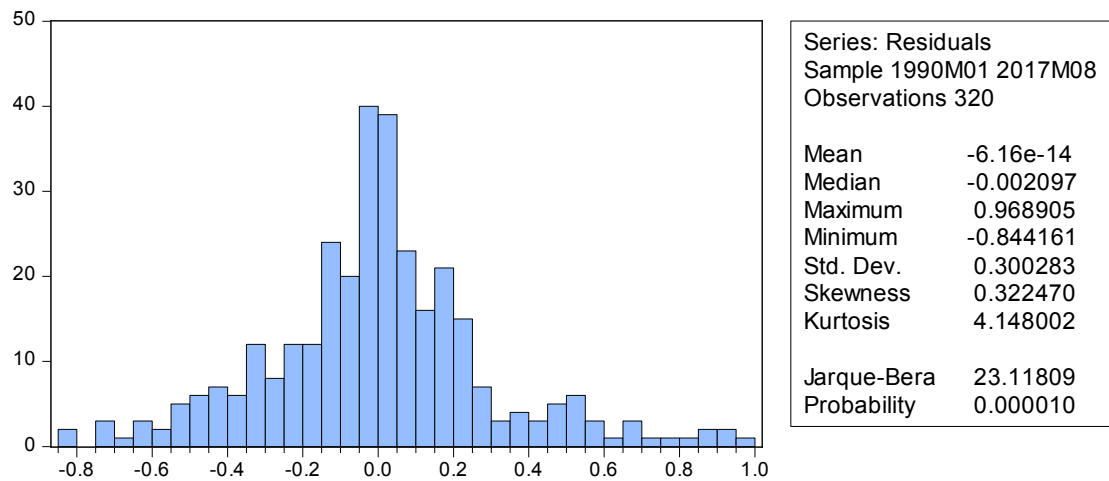


Figure 1: Normality test

Appendix C: ARDL Tests and Diagnostics

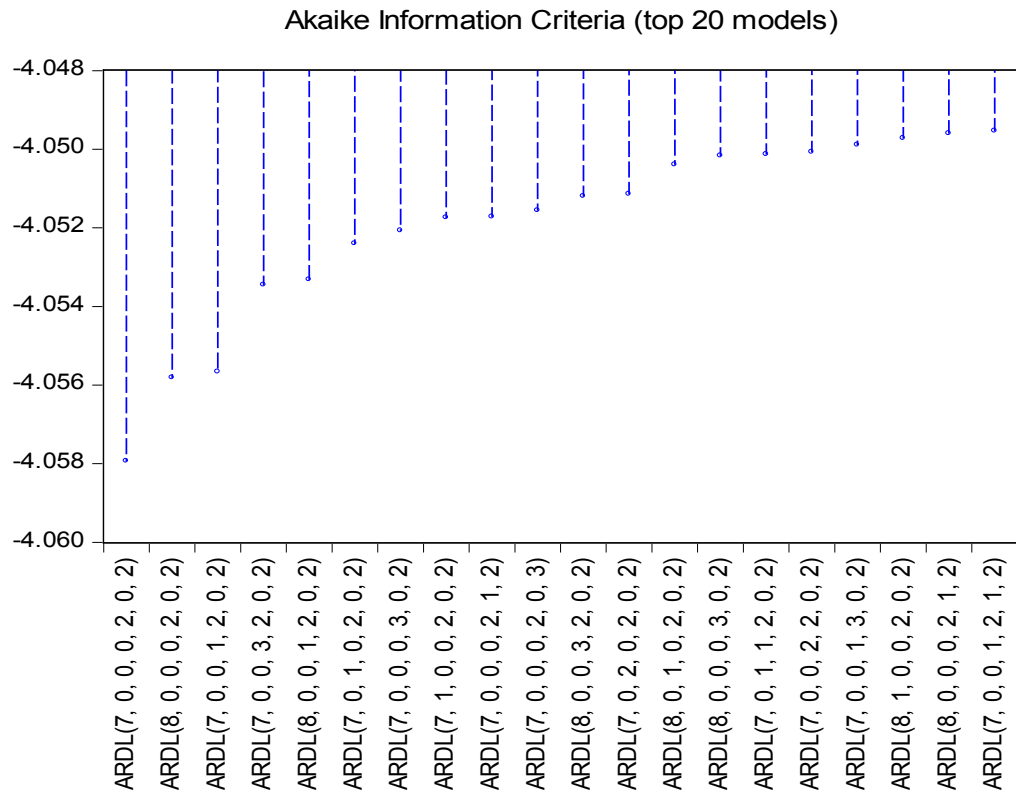


Fig. 1: AIC lag selection graph

Source: Field Survey, Andoh (2019)

Table 1: ARDL for SR, LPP, LIR, LCPI, LER, LM3, and LFDI

Dependent variable: SR

Method: ARDL

Sample (adjusted): 1990M08 2017M12

Maximum dependent lags: 8 (Automatic selection)

Dynamic regressors (3 lags, automatic): LPP LIR LCPI LER LM3 LFDI

Selected Model: ARDL(7, 0, 0, 0, 2, 0, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SR(-1)	1.581841	0.056811	27.84389	0.0000
SR(-2)	-0.505574	0.109922	-4.599409	0.0000
SR(-3)	-0.214637	0.121333	-1.768995	0.0779
SR(-4)	0.181635	0.121593	1.493798	0.1363
SR(-5)	0.429270	0.124602	3.445128	0.0007
SR(-6)	-0.821253	0.122422	-6.708377	0.0000
SR(-7)	0.323801	0.064593	5.012976	0.0000
LPP	-0.006249	0.006316	-0.989481	0.3232
LIR	0.002966	0.006515	0.455321	0.6492
LCPI	0.002171	0.004483	0.484362	0.6285
LER	-0.290553	0.094799	-3.064945	0.0024
LER(-1)	0.595788	0.163212	3.650387	0.0003
LER(-2)	-0.294875	0.097753	-3.016524	0.0028
LM3	-0.002537	0.008860	-0.286390	0.7748
LFDI	0.390588	0.067774	5.763120	0.0000
LFDI(-1)	-0.616769	0.128792	-4.788885	0.0000
LFDI(-2)	0.226502	0.069572	3.255664	0.0013
C	0.021297	0.057720	0.368962	0.7124

R square: 0.994773

F-statistic: 3302.734 (Prob. F-Statistic 0.000000)

Durbin-Watson Stat.: 1.969061

Source: Field Survey, Andoh (2019)

Table 2: Serial correlation tests of ARDL (7, 0, 0, 0, 2, 0, 2) model

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.125019	Prob. F(2,293)	0.8825
Obs*R-squared	0.266878	Prob. Chi-Square(2)	0.8751

Source: Field Survey, Andoh (2019)

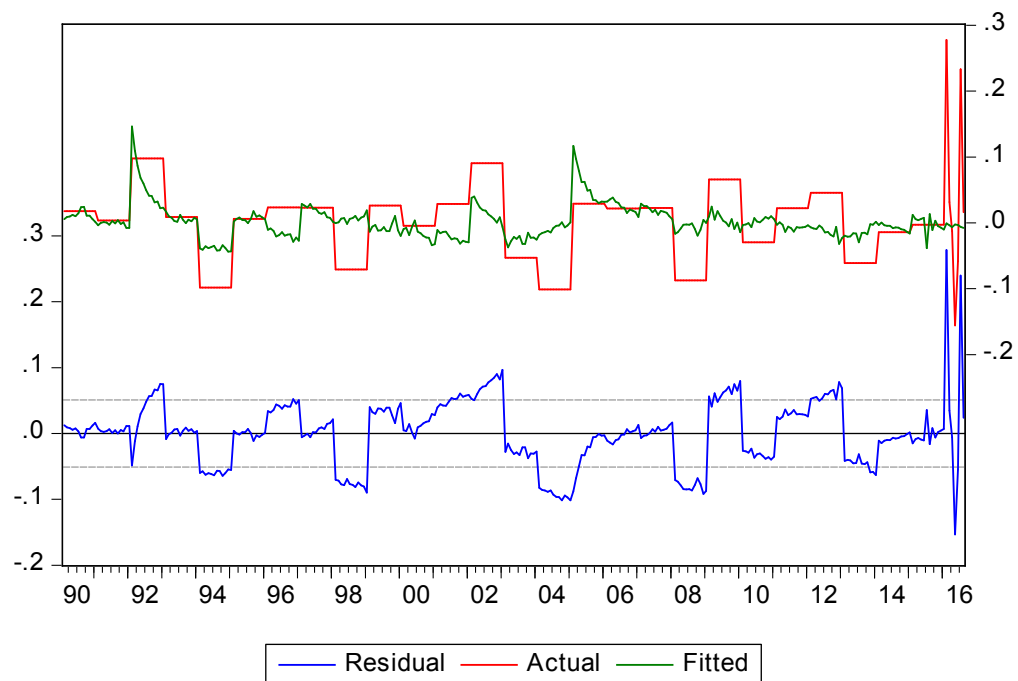


Figure 2: Dynamic stability evaluation

Source: Field Survey, Andoh (2019)