THE IMPACT OF SELECTED MACROECONOMIC VARIABLES ON STOCK RETURN IN GHANA

By

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DECLARATION

I hereby declare that this submission is my own work toward Mphil Business Administration (Finance option) and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University except where due acknowledgement has been made in the text.

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DEDICATION

I dedicate this thesis to my lovely wife, Rachel Sallah and my parents, Mr and Mrs Mawuli Sallah

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I am very grateful to the Almighty God for having taken me this far especially during the challenging moments. Sincerely, this research has been made possible by the assistance I had from various worthy people whose effort will forever be appreciated.

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ABSTRACT

The study examines the impact of three macroeconomic variables (Treasury bill rate, Exchange rate and inflation rate) on stock returns, represented by the Ghana Stock Exchange Composite Index, in Ghana. The independent variable were cointegrated so after converting the variable into first difference, Vector Error Correction Model (VECM) was used to analyse the long run and short run estimates of the relationship between the independent variables and the dependent variable. A test of causality and impulse response existing between the variables was done to see if any of the variables granger causes GSE-CI and if shocks in any of the variables contribute to the fluctuations in the GSE-CI. It revealed that there was a negative relationship between the Treasury bill rate and Inflation rate and stock returns whiles there was a positive relationship between the exchange rate and the stock return. Also the kind of causality that exists was unidirectional causality from exchange rate to GSE-CI. Lastly shock in the GSE-CI (own shock) account for the greatest fluctuations in the stock return in Ghana.

ACRONYMS AND ABBREVIATIONS

ADF	Augmented Dickey-Fuller
CAPM	Capital Asset Pricing Model
EXR	Exchange Rate
GHC	Ghana Cedi
GSE	Ghana Stock Exchange
GSE-CI	Ghana Stock Exchange Composite Index
INF	Inflation Rate
LR	Long Run
US	United States
USD	United States Dollar
VAR	Vector Autoregression
VECM	Vector Error Correction Model

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CHAPTER ONE

INTRODUCTION

1.0 BACKGROUND OF THE STUDY

Developed and emerging nations throughout the world thrive on investment opportunities its citizens embark on. Levy, H., and Post, T. (2005) state some of these investment opportunities by classifying financial assets broadly as ‘‘the money market securities, bonds, stocks and derivative securities’’. Most of these securities are traded on various stock exchanges that serve as intermediaries between the buyers and sellers of these securities.

Stock market efficiency contributes largely to a vibrant performance of the stock exchange. Among other factors that create efficiency in the stock market are the large number of buyers and sellers in the stock market. Countries like USA, Britain, Singapore, China, Germany, and amazingly other nations like Brazil and Malaysia have seen a higher rise in the performance of its stock market investment over some years now. This is of no surprise because these are nations that have a greater number of her citizens, both buyers and sellers, investing their finances in the stock market securities.

A stock exchange market is the centre of a network of transactions where buyers and sellers of securities meet at a specified price. Stock market plays a key role in the mobilization of capital in emerging and developed countries, leading to the growth of industry and commerce of the country, as a consequence of liberalized and globalized policies adopted by most emerging and developed government. Many factors can be a signal to stock market for participants to expect a higher or lower return when investing in stock and some of these factors are macroeconomic variables fluctuation. The change in macroeconomic variables can significantly impact stock price return.

The Ghana Stock Exchange was established to enhance an economic reform that was started in the 1980s to help ensure sustainable economic growth. Boateng (2004) stated in his research that, there were many years of experiment with a lot of state interventions before a consensus emerged that the state needed private sector participation and that the stock market will help build a more dynamic economic growth since it will make financing more accessible to the private sector firms.

The stock exchange helps mobilise financial resources and channels them to productive investments. This role of the exchange is so important that for the country to achieve its full benefits there should be a good and significant relationship between stock returns and other macroeconomic variables in the economy. Among the many macroeconomic variables that affect the stock returns, there are three significant ones that mostly affect stock returns. These variables include the foreign exchange rate, interest rate and inflation rate.

There are many literature, both empirical and theoretical, that reveal that macroeconomic variables do influence stock returns. These include Dornbusch and Fisher (1980), Fama 1965, 1990) and Levy (1987). Their findings established that, among the major macroeconomic variables that influence stock return are GDP, interest rate, foreign exchange rate, fiscal balance, inflation, oil prices etc. In Ghana, some studies have been done to investigate the relationship that exist between some the aforementioned variables and stock prices on the Ghana Stock Exchange. These researches focused on the volatility of exchange rate and interest rate on the stock return as measured by the GSE All Share Index

An economy could be said to be economically stable or unstable by measuring its macroeconomics variables. Inflation, interest rate and exchange rate are some macroeconomics variables that show economic condition in Ghana. Investors put their monies in stock to gain

financially through dividend payment and capital gains. Although investment in stocks account for a huge investment part of investment portfolios other opportunities exist that are often taken by investors. These other opportunities compete with stock investment. This is because investors have the options to invest in other ventures that are favoured by the variables. Among the options investors can put their money in for higher return are investing in treasury bills that is the most risk free venture, trading in foreign exchange to take advantage of favourable changes in the rate over a period of time using their monies in production and manufacturing enterprises.

This study is focused on the matters regarding the effect of macroeconomic variables on Stock prices in Ghana Stock Market. Although there are number of macroeconomic variables affecting the Stock Price changes, this study focuses on the effect of interest rate, inflation and exchange rate. The effect of macroeconomic variables on stock prices may differ from one country to another. The main objective of this study is to investigate the effect of the selected macroeconomic variables on stock prices in Ghana stock exchange.

1.1 PROBLEM STATEMENT

The government of Ghana has implemented many programs to help create a good economic environment to boost investment by its citizens and especially for foreign investors. The establishment of the Ghana Stock Exchange has contributed to creating a wide variety of investment opportunities for investors and business entities seeking capital for expansion. The performance of stocks on the GSE as shown by the GSE composite index proves that sometimes stock returns goes favourable for investors while in some other periods the performance of stock turns low. Statistics shows the ups and downs of performance of stocks listed on the GSE.

GSE-CI measures the overall performance of the GSE. As at the end of the year 28th December 2011, the composite index fluctuated from 967.01 to 2382 on 7th July 2014 and 1899.78 for December 2015. The volume of shares traded also followed similar trend to the extent that the volume recorded as low as 234.29 on 1st December 2015. The index value changes for the end of years 2011, 2012, 2013, 2014 and 2015 were 863.09, 1039.86, 1786.6, 2243.63 and 1930.06 respectively. (*www.gse.com.gh)*

A careful examination of foreign exchange rate and interest rate history in Ghana shows some considerable level of instability. The cedi weakened against the US dollar as a result of high demand for foreign exchange. In the first quarter of 2012, the cedi depreciated by 8.3 per cent against the US dollar, compared to 2 per cent depreciation in the same period of 2011. The weakening of the local currency started in the last quarter of 2011 and was driven by several factors including the growing demand for foreign exchange to support increased economic activity due to the expansion of the economy. Treasury bill rate on the other hand had some instability from 9.3% in August 2011 to as high as 25.8% in October 2014. Ghana also had some unfavourable rates in inflation from about 8.4% in September 2011 to 17.7 in December 2011.

It is therefore, of great importance to explore the effect of the foreign exchange rate, interest rate and inflation rate changes on stock returns in Ghana. There are few scientific researches done to ascertain the effect of changes of the aforementioned variables on the stock return in Ghana. Some of these researches are Adjasi et al (2008) and Adam and Twneboah (2008). These researches touch on the relationship between the variables and stock return in Ghana but they do not empirically check the causality and the extent to which shocks in the variables affect the fluctuations in the GSE-CIthat. This study is therefore to examine the effect of foreign exchange and interest rate changes on stock market returns in Ghana, the causality and

the extent to which shocks in the dependent and independent variables (variance decomposition) affect the variations in the fluctuation in the stock return in Ghana.

1.2 RESEARCH OBJECTIVES

The study seeks to investigate

1. The relationships between the Treasury bill rate, exchange rate and Inflation and stock return in Ghana.
2. The extent to which shocks in GSE-CI treasury bill rate, exchange rate and Inflation account for the fluctuations in the GSE-CI
3. Whether there is a causality between the Macroeconomic variables and the GSE-CI and if there is, is unidirectional or bidirectional

1.3 RESEARCH QUESTIONS

1. What relationships exist between the treasury bill rate, exchange rate and Inflation and GSE-CI
2. To what extent does shocks in the variations of the GSE-CI, treasury bill rate, exchange rate and Inflation account for the fluctuations in the GSE-CI
3. Do the treasury bill rate, exchange rate and Inflation cause unidirectional, bidirectional or no changes in the GSE-CI

1.4 SIGNIFICANCE OF THE STUDY

This study examines whether stock market returns are influenced by interest rate and exchange rate changes in Ghana. This will give investors and potential investors an empirical information for them to understand whether changes in interest rates and exchange rates affect returns on the stock market and the extent it affects investment in stocks markets. It will assist local firms

to identify periods that may be conducive to get listed on the stock market as well as assist investors to make good investment decisions.

The findings of this study would help the country and government to decide on which sector of the economy would need special attention in terms of attracting direct foreign investment and earning much revenue. In addition to being useful as a source of information, it may also serve as a basis for further researches in the areas concerning the activities of both foreign and local investors.

1.5 SCOPE AND LIMITATION OF STUDY

The research was done using data covering a period of five years. This period span from 2011 to 2015. Obtaining and collating data for the research was one of the limiting factors for this research. Weekly data on Treasury Bill Rate (representing Interest Rate), Cedi to Dollar rate (representing Exchange Rate) and Ghana Stock Exchange Composite Index from the above mentioned period was used. The inflation data was monthly due to the reason that there is no weekly data on inflation in Ghana. The researcher therefore used the monthly inflation data to represent the weekly inflation data. The use of these variables, in the researcher's view, may not reflect the whole effects of the macroeconomic variables on the stock market returns but will give a fair representation of the effect of the macroeconomic variables on the stock returns in Ghana. Also these variables were used because data on other economic variables were had to get for this research.

1.6 ORGANISATION OF THE STUDY

The study consists of five chapters as follows:

Chapter one comprises the background of the study, statement of the problem, objectives of the study, significance of the study, scope and limitation of the study and the organisation of the study.

Chapter two presents a review of the relevant literature on interest rate and exchange rate changes on stock market that will form the theoretical framework for the study.

Chapter three gives detail research methodology. It delineates the sources of data, and empirical design. Chapter four reports the empirical results. It covers data presentation, analysis and discussion. Here secondary data obtained using various means outlined in the methodology is organized into a meaningful data format, analysed and discussed in order to draw conclusions.

Chapter five presents the findings from the data analysis and offers conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

This chapter reviews relevant literature that touches on the relationship between macroeconomic variables and stock market in the world. It starts with the empirical findings, then theoretical researches and conceptual framework.

2.1 RESEARCHES DONE ON THE TOPIC

2.1.1 Evidence from Developed Countries

Greetha et al (2011) analyzed data collected from Malaysia, United States and China. The used data on Interest rates, inflation rate, exchange rate and GDP as their independent variable with Stock returns as the dependent variable. They found that Inflation, exchange rate interest rate and GDP are all significant in explaining the changes in stock market return in the long run. In Malaysia it was revealed in their findings that expected inflation, exchange rate and interest rate have negative impact on stock market return whiles GDP had positive impact on the stock market return. With United States, their result showed that there was however a difference in the relationship between the variables and Stock return when compared to that of Malaysia. The result showed a negative relationship between the GDP and stock return, with the other three variables having positive impact on stock return. In the United States also the exchange rate emerged the variable that had the highest impact. For China, the results proved that exchange rate and inflation all had negative impact on the stock market return but interest rate and GDP had positive impact on the stock return. In all the findings the exchange rate had the biggest impact in determining the stock return.

The conclusion drawn from the analysis of Ravazzolo (2005) showed that the US stock market causes the variation in the stock prices. They found that there was a link between the foreign exchange and the local stock markets. Although foreign exchange restrictions have not been found to be an important determinant of the link between the domestic stock market and foreign exchange markets, the analysis indicated a close association between stock prices and foreign exchange markets are positively related. The research supported his hypothesis that a depreciation of the currency may depress the stock market and the stock market will react with a less than one percent decline to a one percent depreciation of the exchange rate. By implication an appreciation in exchange rate boosts the stock market. On the other hand a booming stock market does not lead to currency depreciation. This research used data from US and UK between the periods of 1990 to 2004

There have been other researches done to ascertain the relationship between stock prices and interest rates. According Fama (1981, 1990), Chen, et al (1986) and Chen (1991) there was a strong positive correlation between common stock and real economic variables including interest rate. They sought to find the relationship between macroeconomic variables and stock prices with US economic data.

Hardouvelis (1987) had results that pointed out that there exist an inverse relationship between stock prices and changes in interest rates due to money supply surprises. According to his findings, interest rates influence stock prices. A regression ran together with Granger Causality test shows that interest rate is a significant factor for stock prices changes. The results of his research showed a significant negative relationship between the variables.

Alan and Uddin (2009) did a research using data in 15 countries over a period 10 years and found that interest rate has there was a significant negative relationship between

macroeconomic variables and share prices. This result was reflected in all the fifteen develop and developing countries he used in his research.

Quadir and Monjoral (2012) found that the effect of treasury bill rates and industrial production on stock returns were statistically insignificant. This, according to him, is due to the reason that a good number of macroeconomic variables such as inflation rate, exchange rate, balance of trade and consumer price index that were influential in determining the value of stock returns were absent from the model.

There was support for the view that unanticipated changes in inflation and interest rates played important roles in major movements in the U.S. stock market since World War II. Bordo et al (2008) found that inflation and interest rate shocks have large, negative impacts on stock market conditions, apart from their effects on real stock prices. Their findings revealed that disinflationary shocks, helped explain the United State's stock market boom of 1994-2000, whereas inflationary shocks can help explain the bust of 1973-74.

Zohaib Khan etal (2012) use multiple regression to analyse data and got the results that there was a weak variation in the dependent variable due to independent variables and that interest rate and inflation have significant impact on returns of KSE 100. Exchange rate is negatively related to stock returns. Increase in exchange rate causes an inverse impact or decease in stock returns. Decrease in the stock returns occurs because foreign investors invest their money in the stocks so any decrease in exchange rate causes decrease in their income which results in decrease in purchasing power.

There was mixed results in the stock returns and the interest rates. Ratanapakorn and Shame

2007 got a negative relationship between stock prices and long term interest rates, and a positive relationship between stock prices and money supply, inflation, the exchange rate, and the short term interest rates. The mixed result was as a result of seemingly inefficiency stock market.

Fama (1981) who has been one of the well known researchers in the stock market argues that expected inflation is negatively correlated with anticipated real activity, which in turn is positively related to returns on the stock market. This will result in the stock market returns being negatively correlated with expected inflation, which is often proxied by the short-term interest rate. On the other hand, the influence of the long-term interest rate on stock prices stems directly from the present value model through the influence of the long-term interest rate on the discount rate. Campbell (1987) on his part analysed the relationship between the yield spread and stock market returns. He made a conclusion that the same variables that have been used to predict excess returns in the term structure also predict excess stock returns. He deduced that a simultaneous analysis of the returns on bills, bonds and stock should be beneficial. His results support school of thought that has that the term structure of interest rates can be used to predict excess returns on the US stock market effectively.

Kaul (1990) researched into the relationship between expected inflation and the stock market which, Fama (1981) concluded that it should be negatively related since expected inflation is negatively correlated with anticipated real activity, which in turn is positively related to returns on the stock market. He used the short-term interest rate as a proxy for expected inflation.

Zhou (1996) used regression analysis to study the relationship between interest rates and stock prices. He found that interest rates have an important impact on stock returns, especially in long term. The result rejected the hypothesis that expected stock returns move one-for-one with ex ante interest rates. He added in the research that, long-term interest rate explained a major part

of the variation in price-dividend ratios and further suggested that the high volatility of the stock market is related to the high volatility of long-term bond yields and may be accounted for by changing forecasts of discount rates.

It was found by Levy (1987) that the USD exchange rate changes can adversely affect a firm's gross profit but the degree to such impact varies sectorally. He showed with empirical tests that the changes in the external value of the USD have a very great impact on profits of durable goods manufacturers as compared to certain service industries.

Sonnen and Hennigar (1998), in their study found a negative relationship, which was a very weak relationship, between changes in the USD exchange rate and average industrial stock price.

In his analysis, inflation reduces net earnings on the stock market by imposing an additional tax on nominal capital gains. Even though the real share price remained constant at a new equilibrium value, inflation caused the nominal capital gains to reduce since capital gains are taxed at lower rate than ordinary income and only when the stock is sold. The equivalent tax rate on accrued capital gains reduced the earning due to the effect of inflation. Feldstein (1983)

2.1.2 Evidence from Developing Countries

In India Kumar (2009) examines the changing relationship between stock index and exchange rate. He used the daily data for India and applied the unit root and cointegration tests to test for the long run relationship between the two variables. He also applied linear and nonlinear granger causality tests after removing the volatility dependence from the series to examine the dynamic relationship between the two variables.

Another research examined the nonlinear granger causality between stock index and exchange rate. Hristu-Varsakelis and Kyrtsou (2008), used bivariate noisy Mackey Glass model. Their empirical evidence suggested that there is no long-run relationship between the stock index and exchange rate. There was, however, bidirectional linear and nonlinear granger causality between stock index and exchange rates. The findings of the study strongly support the micro and macroeconomic approach on the relationship between exchange rates and average stock prices.

A research study done in four Asian countries, Pakistan, India, Bangladesh and Sri- Lanka, for the period January 1994 to December 2000 using monthly data by Muhammad and Rasheed (2002). They employed cointegration, vector error correction model technique and standard Granger causality tests to examine the long-run and short-run association between stock prices and exchange rates. It showed no short-run association between the said variables for all the four countries. Regarding whether there was a long run relationship or not, the study got the result that there was no long-run relationship between stock prices and exchange rates for Pakistan and India. However, for Bangladesh and Sri Lanka there was a bi-directional causality between these two financial variables.

Bhattacharya and Mukherjee (2003) did an empirical study to find the relationship between stock prices and macroeconomic aggregates in the foreign sector in India. The researchers applied the techniques of unit–root tests, cointegration and the long–run Granger non– causality test as used by Toda and Yamamoto (1995), to test the causal relationships between the Bombay Stock Exchange Sensitive Index and the exchange rate, foreign exchange reserves and value of trade balance using monthly data for the period of eleven years ending 2000-01. They

concluded that there is no causal relationship between the average stock prices and the three macroeconomic variables under consideration.

In another study by Mishra (2004), it was identified that there is no Granger causality between the exchange rate and stock return. It indicated that stock return, exchange rate return, the demand for money and interest rate are related to each other though there was no clear consistent relationship that exist between them. The forecast error variance decomposition was done to check the how shocks in the variables account for the fluctuations in the stock return. He found that exchange rate return affects the demand for money interest rate causes exchange rate to change; exchange rate affects the stock return; demand for money affects the interest rate.

2.1.3 Evidence from Africa

A study conducted by Ocran (2010) examined the empirical relationship between the rand and the United State Dollar exchange rate and the stock index of South Africa and the US.
He used the Johansen cointegration technique, the Granger causality test, generalised impulse response function and forecasting error variance decompositions. The sample size was monthly data of the three variables for the period January 1986 to November 2005. The Johansen cointegration test could not identify a long-run relationship between the variables of interest.

Adjasi and Biekpe (2005) did an empirical study to investigate the relationship between stock market returns and exchange rate movements in seven African countries. After applying the Cointegration tests, the result showed that in the long-run exchange depreciation leads to increases in stock market prices in some of the countries, but in the short-run exchange rate depreciations reduce stock market returns.

In Nigeria Subair and Salihu (2010) used four macroeconomic variables comprising GDP, inflation rate, interest rate and exchange rate volatility for the period between 1981and 2007. They used Error Correction Model to investigate the effects of exchange rate volatility on the Nigeria stock market. It was found that the exchange rate volatility exerts a stronger negative impact on the Nigeria Stock markets. However the rate of inflation and interest rate did not have long run relationship with stock market capitalization since the major participants in the market is the government. They also made the conclusion that, the exchange rate changes has a very serious implication on the Nigeria Stock market so for the country to experience any serious development of the stock market there is a need to stabilize the movement or rapid changes in exchange rate.

2.1.4 Evidence from Ghana

The effect of exchange rate changes on stock market in Ghana was studied by Adjasi et al (2008). They analysis considered also the effect of other macroeconomic variables like interest rate on stock market volatility. They studied the nature of volatility in both the stock market and the exchange rate from 1995 to 2005 and the results showed that there is a negative relationship between exchange rate changes and stock market returns. It revealed that there is a shock in the volatility of the exchange rate contributed to changes in stock returns on the Ghana Stock Exchange. This gave an indication that changes in the trade off between risk and return is predictable, so investors can use it as a useful guide for risk management.

Adam and Twenenboah (2008) examined the effect of macroeconomic variables on stock price movement in Ghana using Databank Stock Index, Treasury Bill Rate, Consumer Price Index and Exchange Rate as macroeconomic variables. They used Johansen's multivariate cointegration test and Innovation accounting techniques and concluded that there is

cointegration between macroeconomic variables and stock prices in Ghana. The study indicated that there was a long run relationship between the stock prices and the macroeconomic variables they used as independent variables.

2.2 THEORETICAL FRAMEWORK

There are theoretical frameworks that establish the relationship between the exchange rate and stock prices. Below are the review some of the theories.

2.2.1 Flow Oriented Theory

Dornbusch and Fisher (1980), established that exchange rate movement cause stock price movements. The researchers based their theory a model that has the macroeconomic view that stock prices represent the discounted present value of the expected future cash flow of a firm, thus any event that affects the cash flow will be reflected in the firm's stock price in an efficient market. The theory also established that there is a unidirectional causal relationship that runs from exchange rate to stock price. So exchange rate volatility affects stock returns. Mathematically, the Flow Oriented says that the movement in exchange rate that affects stock prices is a function of the characteristics of the firm.

An earlier research finding established that changes in the exchange rate show up profit or loss on the multinational firm's books and that affects its share price. Frank and Young (1972) found that when exchange rate appreciates, exporters will be negatively affected. An appreciation of the currency, according to them, will cause the goods and services of the firm to be 'dearer' on the international market. This will cause the value of their export to decline due to a reason that the prices of the goods will be expensive to buyers on the international market resulting in decrease in profit. If the firm losses profit, their competitiveness on the

domestic market will go down which further results in a decrease in the value of stock prices on the stock market. On the other hand a depreciation of the local currency makes exporting goods profitable and attractive to the firm who does the export. It also increase foreign demand since the purchasing power of the foreign buyers increases. This will show up in the firm's books as more profit which will result in appreciation of the firm's share value. But appreciation of the local currency will reduce the profit for an exporting firm which will

further affect the stock price negatively.

2.2.2 Stock Oriented Theory

The Stock Oriented theory is based on the portfolio balance model. The portfolio balance model says that there is a negative relationship between stock prices and exchange rates. Some of the pioneers in Stock Oriented theory include Branson et al (1977). They stated that a rise in domestic stock prices would attract capital flow that will result in increase in the demand for domestic currency which will cause exchange rate to appreciate. Mathematically, the degree to which stock oriented models explain currency movements is a function of stock market liquidity.

It could be seen that, while flow model holds that exchange rates movements cause stock price to change, the stock theory state that exchange rates are determined by stock market mechanisms. The decrease in domestic stock prices induces foreign investors to lower demand for domestic assets and currency. This will cause capital outflows and depreciation of the domestic currency. When stock prices increase, it becomes attractive to foreign investors who will invest in the country's equity security and these investors derive payback from international diversification. This will result in capital inflows with the effect that domestic currency appreciates. Granger et al (2000).

2.2.3 Arbitrage Pricing Theory (APT)

This theory was developed by Ross (1976). It links macroeconomic variables to stock returns. His theory propounded that the primary influence on stock returns are some economic forces and these forces include unanticipated shifts in risk premiums, changes in the expected level of industrial production, unanticipated inflation and unanticipated movements in the shape of the term structure of interest rate. He denoted these factors with factor specific coefficients that measure the sensitivity of the assets to each factor. The theory derives its basis from the law of one price. The law one price requires that returns on any stock should be linearly related to a set of indexes. This can be written mathematically as $\mathbf{R}_i = \mathbf{a}_i + \mathbf{b}_{i1}f_1 + \mathbf{b}_{i2}f_2 + \ldots \mathbf{b}_{ij}f_j + \mathbf{e}_i$. where $\mathbf{a}_i$ is the expected level of return for stock ***i*** at instance where indices have a value zero. f_1 is the value of jth index that impacts the return on stock ***i***. $\mathbf{b}_{ij}$ is the sensitivity of the stock ***i***'s return to the jth index. $\mathbf{e}_i$ is the random error term with mean equal to zero and variance to $\mathbf{\acute{o}}_{ei}$.

A research to support the Abitrage Pricing Theory was done by Chen et al (1986). They argued that risk factors (in APT) arise from changes in fundamental economic and financial variables such as interest rate, inflation, real business activity, exchange rate and other macroeconomic variable. This theory serves as an extension of the capital asset pricing model (CAPM). They proposed a multifactor approach to explain asset pricing through arbitrage pricing theory.

A similar view was explained by Chen and Ross (1986) that stock return depends on anticipated and unanticipated factors. According these well known researchers in stock market dynamics, the return realized by investors is the result of unanticipated events and these factors are related to the overall economic conditions.

2.3 CONCEPTUAL FRAMEWORK

The conceptual framework of this study is to help in appreciate the relationship among the macroeconomic variables as defined under study. Thus the framework gives an insight into the relationship between Treasury bill rate, inflation rate and exchange rate (Independent variables) and stock market returns (dependent variables) as measured by the GSE Composite index. In this study I adopt a conceptual framework to investigate the effects of the independent variables on the dependent variables.

From the conceptual framework (figure 2.1), it can be deduce that all the three variables have an impact on the stock returns. As noted from the various literatures above, Treasury bill rate and inflation rate have a negative effect on the GSE-CI. The exchange rate however has mixed expectation in either having a positive or negative impact on the GSE-CI. We therefore put these in the diagram below.

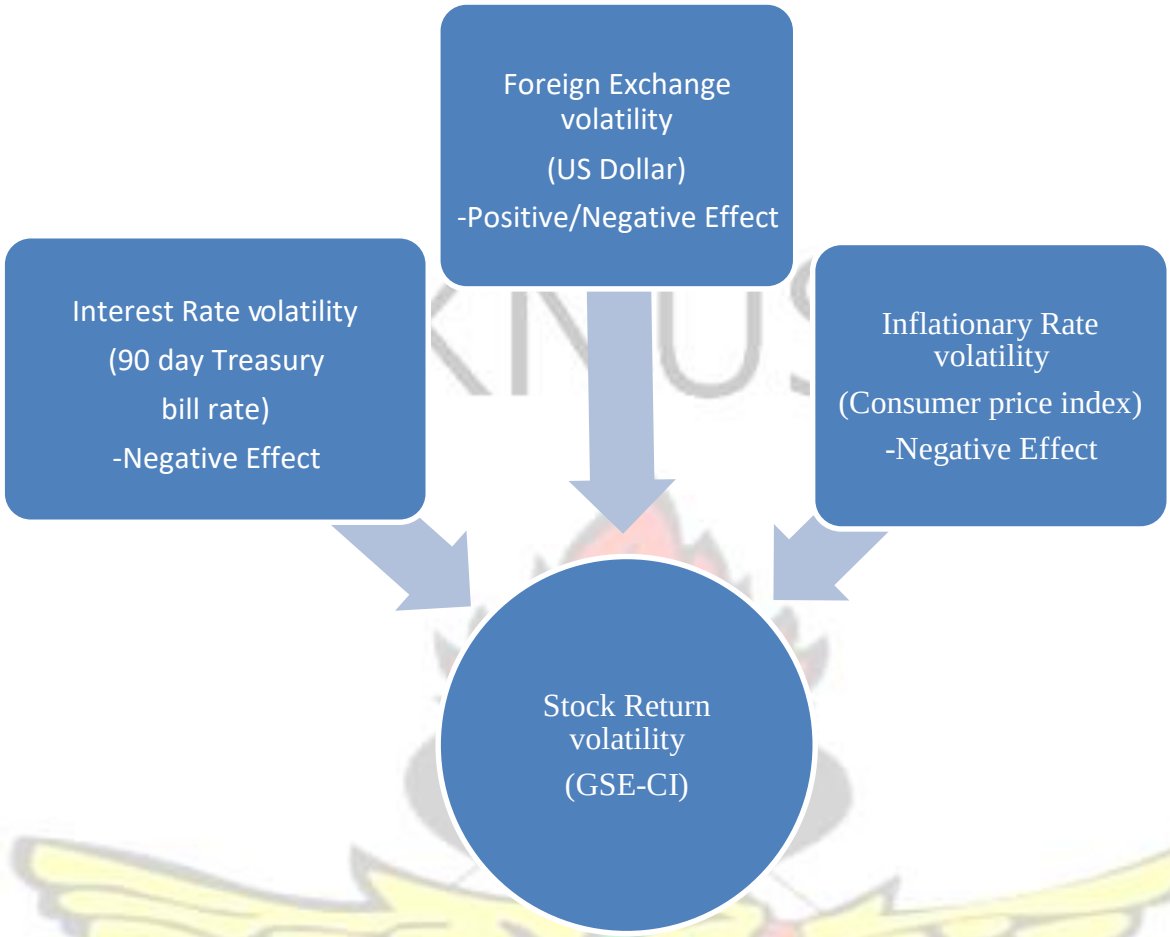


Fig. 3.1 Conceptual framework (Source: developed for this research)

The treasury bill is shown to have a negative relationship with stock return. That is as the treasury bill rate increase, the stock return is expected to decrease and vice versa. This could be that case because if the treasury rate increase, it will be a lucrative or more profitable venture for investors than the investment in stocks. This will affect stock return negatively since most investors are expected to move their money into the treasury bill. But if the treasry bill rate reduces, the opposite of the above is expected to happen.

When exchange rate changes, as explained by the flow oriented theory, it affects the stock return either positively or negatively depending on whether the firms involved are import oriented or export oriented. In an export dominated country an appreciation of the home currency will affect the profitability of companies negatively. This will cause investors to move

their investment in stocks into other portfolio, therefore reducing stock prices. It should be noted that an appreciation of the cedi will result in a reduction in the exchange rate. So this will result in positive relationship with the appreciation of the GSE-CI. But if the country or the companies involved are import oriented, the appreciation of the cedi (reduction in the exchange rate) will result in low cost of inputs which will affect the profitability of the firm positively. As the the firm becomes more profitable, the investors are expected to move their investment into the stock of that firm. This will result in an increase in stock investment and its return. So an appreciation of the cedi as against the dollar will result in an inverse relationship with the GSE-CI.

As interest rate increases, cost of operation for the firms on the GSE will increase. This will result high cost of production. The results will likely be higher prices in the product or services of the firms which in tend may cause a lower demend of the firms product. As the demand of product produced by the firm reduces, their profit likely will reduce making the firm unattractive to stock investors. This may result in less stock return.

CHAPTER THREE

METHODOLOGY

3.0 INTRODUCTION

This study seeks to investigate the relationship between the Ghana Stock Composite Index (GSE-CI), the exchange rate specifically the Ghana cedi and the US dollar (EXR) and the Interest rate (91 day treasury bill rate) issued by the bank of Ghana.

3.1 DATA COLLECTION AND SOURCE

The data used in the empirical analysis was mainly secondary data collected from the period of January 2011 to December 2015 consisting of 254 weekly observations for each variable. The stock indices were obtained from the Ghana Stock exchange whereas the macroeconomic variables namely, exchange rate and interest rate as measured by the 91 day Treasury bill rate was sourced from the Databank Research Group.

The choice of these variables are as a result of the interrelationship and interdependence. The Treasury bill was chosen as the variable to represent the interest rate in the country because this is usually the rate at which financial institution base the interest rate decision on. Investors would want to consider either investing on the stock market or exchange rates market or buy a fixed rate treasury bill in order to ensure higher profitability. The macroeconomic variables in addition help in making investment decisions due to their great impact on investment returns. The Treasury bill rate was used as interest rate since savers usually invest their savings for higher interest with certainty when investment in the stock market does not seem profitable to them.

The data on exchange rate between the Ghana cedi and the US dollar was used due to the dominance of the U.S. Dollar in international transactions and evolving strong trade as well as financial relationship between Ghana and US economy.

1.2 DESCRIPTION OF VARIABLES

3.2.1 GSE Composite Index Misalignment

Misalignment of the GSE-CI, refers to the deviation of the actual GSE-CI from its equilibrium. Both theoretical and empirical findings have suggested that misalignment in the GSE-CI has important implications on the country's economic performance. The researcher expects that increase in the GSE-CI has a positive impact on the other variables under study.

3.2.2 Control variables

The main regressor variable of interest to the researcher is the GSE-CI misalignment. However other variables were included in the model to serve as a control variable to avoid omitted variable bias. The selection of the control variables are based on the on the theoretical and empirical findings and availability of consistent data over a period of time.

Below are the control variables and their prior assumption.

The GSE Composite Index (GSE-CI) will be based on the volume weighted average closing price of all listed stocks. All ordinary shares listed on GSE are included in the GSE-CI at total market capitalization, with the exception of those of listed companies which have shares listed on other markets. The GSE-CI is a market capitalization weighted index, i.e. each constituent is given weight according to its market capitalization. The base date for the GSECI is December 31, 2010 and the base index value is 1000

Exchange Rate (EXR)

The exchange rate is based on the weekly Cedi to USD exchange rate. This is because Ghana's import sector dominates the export sector; therefore depreciation of the Ghana cedi will lead to an increase in prices of production and thereby reducing cash flows to the import dominated companies. Repatriation of earning will also be relatively unattractive to foreign portfolio investors who play a major role on the GSE. If the exchange rate goes up mainly because of it high demands for repatriation then it is expected that its impact on the dependent variable will be negative. It is therefore expected that the exchange rate will have a negative influence or a positive influence on the performance of GSE-CI.

Interest Rate (TBR)

It is established that a negative correlation exist between interest rate and stock market returns. An increase in interest rate will increase the opportunity cost of holding money and investors substitute holding interest bearing securities for share hence falling stock prices.

The Treasury bill rate is used as a measure of interest rate in this study because investing in Treasury bill is seen as opportunity cost for holding shares. The most actively traded money market instruments are Treasury bills which are government issues with maturities of 91 and 182 days. The Bank of Ghana holds auctions of Treasury Bills every week on Fridays. High Treasury bill rates encourage investors to purchase more government instruments. Treasury bills thus tend to compete with stocks and bonds for the resources of investors. The expected relationship between stock prices and Treasury bill rates is thus negative.

Inflation (INF)

This variable is as measured by the consumer price index and it reflects the annual percentage change in the cost of the average consumer for acquiring a basket of goods and services that may be fixed or changed at specified intervals such as yearly. Economic theories predict that inflation results in the reduction in the stock returns. This is because inflation reduces the average consumer's purchasing power hence inability to invest more in long term portfolio like stocks

3.3 Analysis Plan

In this sect ion, the researcher discusses the time series methodologies that will be used in analyzing the dataset. The following tests are expected to be employed: Unit root test for stationarity, Augmented Dickey-Fuller Test, Ordinary Least Square (OLS) method Cointegration test, Vector error correction model, etc. We rely on R statistical computing software to implement the time series methods that will be discussed in this section and all statistical tests were carried out at 5% level of significance.

3.3.1 Exploratory Data Analysis

The techniques used in this section are mostly graphical and descriptive statistics. This procedure will enable the researcher to gain an insight into the data set, extract important variables and their distributions, detects other anomalies.

From literature, we notice that it is common to take the natural logarithms of times series which are growing over time. These variables are estimated in natural logarithms for the following reasons:

- To interpret the coefficients of the cointegrating vector as long-term

elasticities.

- To interpret the first difference as growth rates.

The data distribution was examined using graphs and standard descriptive statistics namely mean, median, standard deviation, skewness and kurtosis. The Jarque-Bera (1980) test is also conducted to ascertain the normality of the data distribution. Under the null hypothesis of normal distribution, Jarque-Bera (J-B) is 0. As a result, J-B value greater than zero is said to have deviated from the normal distribution assumption.

Similarly, skewness and kurtosis represent the nature of departure from normality. In a normally distributed series, skewness is 0 and kurtosis is 3. Positive or negative skewness indicate asymmetry in the series and less than or greater than 3 kurtosis coefficient suggest flatness and peakedness, respectively.

3.3.2 Unit Root Test

Most macroeconomic time series data are found to be non-stationary. A stochastic process is said to be stationary if its mean and variance are constant overtime, while the value of the covariance between two periods depend only on the gap between the periods and not the actual time at which this covariance is considered. If one or more of these conditions are not fulfilled then the process is said to be non-stationary (Charemza and Deadman, 1992).

$$\Delta Y_t = \alpha_1 Y_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta Y_{t-j} + \varepsilon_t, \quad (None), \qquad (i)$$

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta Y_{t-j} + \varepsilon_t, \quad (With\ Constant), \qquad (ii)$$

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_1 t + \sum_{j=1}^{p} \gamma_j \Delta Y_{t-j} + \varepsilon_t, \quad (With\ Constant\ and\ Trend), \quad (iii)$$

The time series property of each variable is then investigated using univariate analysis by applying the Augmented Dickey-Fuller Test (ADF) to check nonstationarity following Dickey and Fuller (1981) In order to check the stationarity of the variables, the ADF test is performed where three regression forms are generated:

Where t=1,2…260 and ε_t as the error term.

3.3.3 Empirical Design (Model Specification and Estimation)

The fundamental estimating equation in log-linear form is as follows:

$$LnGSE\text{-}CI_t = \beta_0 + \beta_1 LnTBR_t + \beta_2 LnEXR_t + \beta_3 LnINF_t + \mathcal{E}_t \quad \text{.....3.1}$$

Where *LnGSE-CI* = natural log of GSE Composite index,

LnEXR = natural log of exchange rate

LnTBR= natural log of Treasury bill rate.

$\mathcal{E}_t$,= The error term is assumed to be independent and identically distributed and

t= time subscript. The expected signs of the above equations are , and (i.e. positive or negative).

The expected signs of the coefficients are**:** β_0**=>,** β_1**= <,** β_2**=< or > and** β_3**=<**

If the unit root test in section 3.2.2 confirm the stationarity in time series data of each variable, then equation (3.1) is estimated appropriately by the Ordinary Least Square (OLS) method. This is done to avoid misleading inferences in the presence of spurious correlation (Granger and Newbold, 1974). As a rule of thumb, (Granger and Newbold, 1974) suggested that one should be suspicious if is greater than Durbin-Watson statistic. If the unit root test rejects the null hypothesis that the series has a unit root, it means that the series is stationary and thus can be used for VAR. But, if the unit root test cannot reject the null hypothesis, it means that the series are not stationary and we can apply difference operator to make the series stationary before testing for VAR.

3.3.4 Cointegration

If the variables are found to have unit roots (non-stationarity), and are of the same order of integration, the cointegrating relationship among variables determined, that is the tendency of the variables to move together in the long run is studied either by the Engle-

Granger (1987) procedure or the Johansen-Juselius procedure (Johansen 1988; Johansen-Juselius 1992, 1999) to overcome the associated problem of spurious correlation and misleading inferences. If the variables are found to be cointegrated, the relationship may be interpreted as a long run relationship. In this study the Johansen-Juselius procedure was used to check the number of cointegrations that exist in between the variables.

3.3.5 Johansen-Juselius Procedure

The Johansen procedure is applied at this point to test for cointegration and this can be done through the Vector Autoregressive (VAR) approach as outlined in Granger (1988).

The appropriate lag-length (p) is selected with the aid of the VAR Lag Order Selection Criteria. This is to help overcome the problem of over or under parameterization that may induce bias and inefficiency in the estimates.

The analysis then begins with a congruent statistical system of unrestricted reduced form as stated below:

$$Y_t = \alpha + \sum_{i=1}^{p-1} \delta Y_{t-i} + \varphi_t; \quad \varphi_t N(0, \Omega); i = 1, 2 \ldots 253 \qquad 3.2$$

Where Y_t is an (3x) vector of order I (1) and/or of order $I(0)$ variables, and α is an(3x) vector of constraints, Letting $\Delta Y_t = Y_t - Y_{t-i}$ then equation (3.2) then becomes

$$Y_t = \alpha + \sum_{i=1}^{p-1} \Psi \Delta Y_{t-i} + \delta Y_{t-i} + \varphi_t \qquad 3.3$$

Since φ_t is stationary, the rank, r of the long-run matrix δ determines how many linear combinations of Y_t are stationary. If r=n , all Y_t are stationary, while if r=0 so that

$\delta = 0$, ΔY_t is stationary, as are all linear combinations if $\mathbf{Y_t}$ is of order $\boldsymbol{I}$ **(1)** . For **0< 1<n,** there exist r cointegrating vectors meaning r stationary linear combinations of Y_t. If this is the case since the study seeks to investigate the long-term relationship between stock market returns and macroeconomic variables in Ghana, then the hypothesis for the cointegration vectors is stated as H_0**:** $\delta = \alpha\beta$ where both α and **β** are matrices. The cointegration vectors of are the error-correlation mechanisms in the system, while contains the adjustment parameters. In order to test the hypothesis, the order of the cointegration vector needs to be determined first.

The order (rank) of cointegration **r** is determined by constructing the trace statistics **(λ_{trace})** and the estimated values of the characteristic roots or eigenvalues **(λ_{max})**. Since in practice the order of cointegration **r** is not known, Johansen (1991) proposes two ways to perform likelihood ratio tests for the value of which differ in assumptions of alternative hypothesis.

These are computed as follows:

$\lambda_{trace} = -T\sum_{t=r-1}^{n} Ln(1-\hat{\lambda}\iota)$, where the null is r=q against the more general alternative r ≤ 1

$\lambda_{max} = -TLn(1-\hat{\lambda}\, r+1)$ where the null is r=q cointegrating vectors with (q=0,1,2,3…) against the alternative that there exist only one additional cointegrating vector (r≤ q+1)

3.4 VECTOR ERROR CORRECTION MODEL

After establishing the existence of the long run associationship among the data series, the next is estimate the error correction model. The VECM which contains full information on maximum likelihood of the relationship between the variables is preferred. It yields efficient estimators of the co-integrating vectors ahead of the other models which could be used. VECM permits co-integration in a whole system of equation in one step without requiring a specific variable to be normalised.

The VECM is has an advantage over the other model in the sense that there no requirement for a prior assumption of endogeneity or exogeneity of the variables. It allows the researcher to examine the causality in the Granger-sense. With VECM the error correction term is evaluated using t-statistics whiles the lagged first differenced term of each variable uses the *F*- test. It helps the researcher to predict the speed with which any disequilibrium between the long run and the short run estimates of the determinants of the equilibrium GSE composite index is corrected for.

This model is used to estimate the long run coefficient parameters of the determinants of the equilibrium GSE-CI. The vector error correction model (VECM) is estimated to find out long-run causality and short-term dynamics if there are an evidence of cointegration relationship among the variables. The VECM is estimated as shown below:

$$\Delta LnGSE - CI_t = \alpha + \partial\mathcal{E}_{t-1} + \sum_{i=1}^{n} U_i \, \Delta LnGSE - CI_{t-i} + \sum_{i=1}^{m} V_i \, \Delta LnTBR_{t-i} + \sum_{i=1}^{k} w_i \, \Delta LnEXR_{t-i} + \sum_{i=1}^{d} X_i \, \Delta LnINF_{t-i} + \mathcal{E}_t \quad \textbf{3.4}$$

Where $\mathcal{E}_{t-1}$ is the Error Correction Term which reflects the deviation from the long-run equilibrium path.

This allows causality to be determined in two ways namely:

- Short run causality, which is determined by the lagged differences of the variables and;
- Long-run causality, which is determined by the significance of the coefficient of the error-correction term.

3.5 WALD TEST — COEFFICIENT RESTRICTIONS

The Wald test computes the test statistic by estimating the unrestricted regression without imposing the coefficient restrictions specified by the null hypothesis. The Wald statistic measures how close the unrestricted estimates come to satisfying the restrictions under the null hypothesis. If the restrictions are in fact true, then the unrestricted estimates should come close to satisfying the restrictions. The coefficients are referred to as C(1), C(2), and so on. The test has the formula C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=0 where C(1) to C(6) are the individual lag coefficient of the unrestricted variable for a particular variable under consideration. The null hypothesis say the equation is 0. This means the lag difference variables jointly influence the dependent variable.

3.6 RESIDUAL TESTS

EViews provides tests for serial correlation, normality, heteroskedasticity, in the residuals from your estimated equation. Not all of these tests are available for every specification.

3.6.1 TEST OF NORMALITY

Jarque-Bera statistic Test

This test displays a histogram and descriptive statistics of the residuals, including the Jarque-Bera statistic for testing normality. If the residuals are normally distributed, the histogram should be bell-shaped and the Jarque-Bera statistic should not be significant. This test is available for residuals from least squares, two-stage least squares, nonlinear least squares, and binary, ordered, censored, and count models.

A test of normality in statistical packages is the Jarque-Bera (JB) test. This is an asymptotic, or large sample, test and is based on OLS residuals. This test first computes the coefficients of skewness, S, and kurtosis, K, of a random variable (e.g., OLS residuals). For a normally distributed variable, skewness is zero and kurtosis is 3. Jarque and Bera have developed the following test statistic.

$$JB = \frac{n}{6}\left[S^2 + \frac{(K-3)^2}{4}\right] \quad \text{.....3.5}$$

Where n are the sample size, S represents skewness, and K represents kurtosis. They have shown that under the normality assumption the JB statistic given in Equation (3.5) follows the chi-square distribution with 2 d.f. asymptotically (that is, in large samples). Symbolically,

$$JB_{asy} \sim X^2(2)$$

Where asy means asymptotically.

As you can see from Eq. (3.5), if a variable is normally distributed,

S is zero and is also zero, and therefore the value of the JB statistic is zero. But if a variable is not normally distributed, the JB statistic will assume increasingly larger values. What constitutes a large or small value of the JB statistic. If the computed chi-square value from Eq. (3.5) exceeds the critical chi-square value for 2 d.f. at the chosen level of significance, we reject the null hypothesis of normal distribution; but if it does not exceed the critical chisquare value, we do not reject the null hypothesis.

3.6.2 Heteroskedasticity Test

Breusch-Pagan-Godfrey's Test

This is a test for heteroskedasticity in the residuals from a least squares regression (BreuschPagan-Godfrey, 1980). Ordinary least squares estimates are consistent in the presence heteroskedasticity, but the conventional computed standard errors are no longer valid. If it happens that in this research that there is a problem of heteroskedasticity, there should be two choices: the robust standard errors option to correct the standard errors or model the heteroskedasticity to obtain more efficient estimates using weighted least squares.

Breusch-Pagan-Godfrey's heteroskaticity test is a test of the null hypothesis of no heteroskedasticity against heteroskedasticity of some unknown general form. The test statistic is computed by an auxiliary regression, where we regress the squared residuals on all possible (nonredundant) cross products of the regressors. EViews reports two test statistics from the test regression. The F-statistic is an omitted variable test for the joint significance of all cross products, excluding the constant. It is presented for comparison purposes. The Obs*Rsquared statistic is Breusch-Pagan-Godfrey's test statistic, computed as the number of observations times the centered R^2 from the test regression. The exact finite sample distribution of the F-statistic under H_0 is not known, but Breusch-Pagan-Godfrey's test statistic is asymptotically

distributed as a X^2 with degrees of freedom equal to the number of slope coefficients (excluding the constant) in the test regression.

Breusch-Pagan-Godfrey heteroskedasticity test also describes this approach as a general test for model misspecification, since the null hypothesis underlying the test assumes that the errors are both homoskedastic and independent of the regressors, and that the linear specification of the model is correct. Failure of any one of these conditions could lead to a significant test statistic. Conversely, a non-significant test statistic implies that none of the three conditions is violated. When there are redundant cross-products, EViews automatically drops them from the test regression.

Breusch-Pagan-Godfrey test of heteroscedasticity is quite easy to apply. To see how the test is applied, suppose we have the following model:

$$Yi = B_1 + B_2 LnTBR + B_3 LnEXR + B_4 LnINF + U_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.6$$

Breusch-Pagan-Godfrey test proceeds as follows:

1. We first estimate regression (3.6) by OLS, obtaining the residuals, *ei*.

2. We then run the following auxiliary regression:

$$e_i^2 = A_1 + A_2\, LnTBR + A_3\, LnEXR + A_4 LnINF + A_5 LnTBR^2 + A_6 LnEXR^2 +$$

$$A_7 LnINF^2 + A_8(LnTBR)(LnEXR)(LnINF) + U_I \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.7$$

That is, the residuals obtained from the original regression (3.6) are squared and regressed on all the original variables, their squared values, and their cross-products. Additional powers of the original independent variables can also be added. The term ***Ui*** is the residual term in the auxiliary regression.

3. Obtain the R^2 value from the auxiliary regression (3.7). Under the null hypothesis that there is no heteroscedasticity (that is, all the slope coefficients in Equation 3.7 are zero), the R^2 value obtained from regression (3.7) times the sample size (n), follows the distribution with d.f. equal to the number of explanatory variables in regression 3.7 (excluding the intercept term):

$n.R^2 \sim X^2_{k-1}$.....3.8

Where (k - 1) denotes d.f. in model (3.7) the d.f. are 5.

If the chi-square value obtained from exceeds the critical chi-square value at the chosen level of significance, or if the P value of the computed chi-square value is reasonably low (say 1% or 5%), we can reject the null hypothesis of no heteroscedasticity. On the other hand, if the p value of the computed chi-square value is reasonably large (say above 5% or 10%), we do not reject the null hypothesis. Damodar and Dawn (2010).

3.6.3 A General Test of Autocorrelation:

The Breusch-Godfrey (BG) Test

This test is general in that it allows for stochastic regressors, such as the lagged values of the dependent variables, higher-order autoregressive schemes and simple or higher-order moving averages of the purely random error terms.

The following procedure has to be followed to run this test:

1. Run the GSE-CI regression and obtain residuals from this regression, .

2. Now run the following regression $e_t = A_1 + A_2LnTBR + A_3LnEXR + A_4LnINF + C_{1et-1} + C_{2et-2} + \ldots\ldots C_{ket-k} + V_t$ .....3.9 That is, regress the residual at time t on the original regressors, including the intercept and the lagged values of the residuals up to (t-k) time, the

value of k being determined by trial and error or on the basis of Akaike or Schwarz information criteria. Obtain the R^2 value of this regression. This is called the auxiliary regression.

Calculate nR^2, that is, obtain the product of the sample size n and the value obtained in (2). Under the null hypothesis that all the coefficients of the lagged residual terms are simultaneously equal to zero, it can be shown that in large samples

$nR^2 \sim X^2k$

That is, in large samples, the product of the sample size and follows the chi-square distribution with k degrees of freedom (i.e., the number of lagged residual terms). In econometrics literature, the BG test is known as the Lagrange multiplier test.

3.6.4 Variance Decompositions

The first step in computing variance decomposition is to assume that the conditional expectation of Y given X is linear, that is $E(Y \mid X) = X\beta$. This follows directly from the linearity and zero conditional mean assumptions. It then follows that the unconditional mean is $E(Y) = E(E(Y \mid X)) = E(X)\beta$

This particular property of the mean is then used to compute the decomposition. In light of this we need to extend this type of procedure to the case of the variance. Using the analysis of variance formula, the unconditional variance of Y (GSE-CI) can be written as having causality on TBR as:

Var (LnGSE-CI) = E [Var (LNGSE-CI | LnTBR] + E {[E(LnGSE-CI | LnTBR) – E(LnGSE-CI)]$^{2)}$…….3.10

$= E [Var (LnGSE-CI | LnTBR] + E \{[LnTBR\square - E(LnTBR)\square]^2\}$……3.11

= E [Var (LnGSE-CI | LnTBR] + □'Var(LnTBR)□……..3.12

Where the expectations are taken over the distribution of LnTBR. The first component of the equation is the within-group component (also called residual variance), while the second component is the between-group component (also called regression variance). Writing Var (LnGSE-CI | LnTBR, D_g =) ≡ V_g(LnTBR), g=AB we can write the difference in variance across groups B and A as:

$\Delta_O^V = E[\,V_B(LnTBR)|D_B = 1] - E[V_A(LnTBR)|D_B = 0] + \beta'_B\, Var\,[LnTBR]D_B = 1]\,\beta'_A\, Var\,[LnTBR]D_B = 0]\,\beta_A$…….3.13

A few manipulations yield $\Delta_O^V = \Delta_X^V + \Delta_S^V$ where

$\square_X^V = \{E[\,V_A(LnTBR)|D_B = 1] - E[V_A(LnTBR)|D_B = 0]\} + \beta'_A\,\{Var\,[LnTBR]D_B = 1] - Var\,[LnTBR]D_B = 0]\}\,\beta_A$……..3.14

And

$\square_S^V = \{E[\,V_B(LnTBR)|D_B = 1] - E[V_A(LnTBR)|D_B = 1]\} + (\beta_B - \beta_A)'Var\,[LnTBR]D_B = 1](\beta_B - \beta_A)$……..3.15

While it is straightforward to estimate the regression coefficients (β_A and β_B) and the covariance matrices of the covariates (Var[LnTBR | D_B= 0] and Var[LnTBR | D_B= 1]), the within group (or residual) variance terms v_A(LnTBR) and v_B(LnTBR) also have to be estimated to compute the decomposition.

Several approaches have been used in the literature to estimate v_A(LnTBR) and v_B(LnTBR). The simplest possible approach is to assume that the error term is homoscedastic, in which case v_A(LnTBR) = σ_A^2 and v_B(LnTBR) = σ_B^2, and the two relevant variance parameters can be estimated from the sampling variance of the error terms in the regressions. The homoscedasticity assumption is very

strong, however. When errors are heteroscedastic, differences between σ_A^2 and $\sigma_B{}^2$ can reflect spurious composition effects. We can then write the aggregate components of the variance decomposition as

$$\square_X^V = \{E[\,LnTBR|D_B = 1] - E[LnTBR|D_B = 0]\delta\} + \beta'_A\{Var\,[LnTBR]D_B = 1] - Var\,[LnTBR]D_B = 0]\}\,\beta_A \quad \text{.....3.16}$$

and

$$\square_S^V = \{E[\,LnTBR\,|D_B = 1](\delta_B - \delta_A)\} + (\beta_B - \beta_A)'Var\,[LnTBR]D_B = 1](\beta_B - \beta_A) \quad \text{.....3.17}$$

3.6.5 Granger Causality Analysis

Granger (1989) supposed two types of causality. The first type of test is through lagged variables (LnGSE-CI_{t-1}, $LnTBR_{t-1}$) when the coefficients of these variables are all statistically significant, and the second type can be used if the variables are cointegrated and uses an error correction-term-based causality.

The first type of Granger causality test can be expressed as follows:

LnGSE-$CI_t = \alpha_1 + \sum_{t=1}^{n} \alpha_{2i}\ LnGSE - CI_{t-i} + \sum_{j=1}^{n} \alpha_{3j}\, LnTBR_{t-j} + U_{1t}$ 3.18

$LnTBR_t = \beta_1 + \sum_{t=1}^{n} \beta_{2i}\ + LnTBR_{t-i}\ \sum_{j=1}^{n} \beta_{3j}\, LnGSE - CI_{t-j} + U_{2t}$.....3.19

From those equations, $LnTBR_t$ is said to cause $LnGSE\text{-}CI_t$, provided α_{3j} is not zero. Similarly, $LnGSE\text{-}CI_t$ is causing $LnTBR_t$ if β_{2i} is not zero in equation (3.19). If both of those significances occur, this shows us a bidirectional causality. The significance of those parameters are tested with joint hypothesis α_{3j} 3j = 0 for equation (10) and $\beta_{2i} = 0$ for equation 3.19.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND DISCUSSION OF RESULTS

4.0 INTRODUCTION

This chapter presents the empirical findings of the research that is obtained from various models. The econometric software package used for this is E-views application software 16. Results from the Unit Root testing, Co-integration and VECM are presented, analysed and discussed. The test results of the predictive poIr of the model for this analysis are also presented in this chapter. These are presented below:

4.1 GRAPHICAL PRESENTATION OF THE VARIABLES

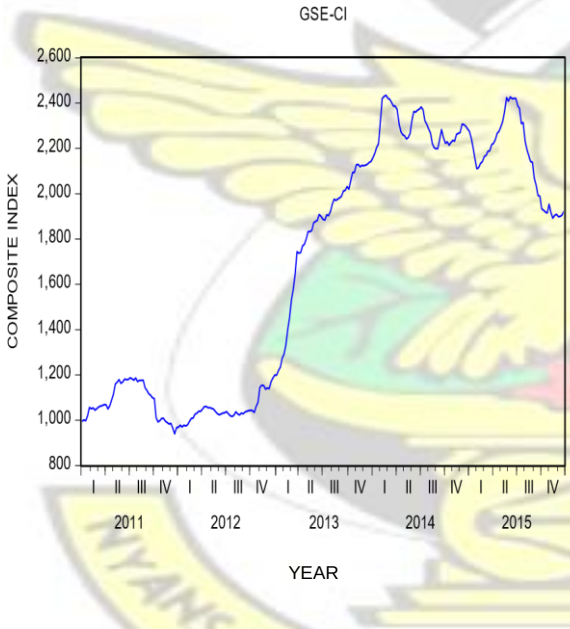


Fig.4.1 Time Series Plot of GSE-CI

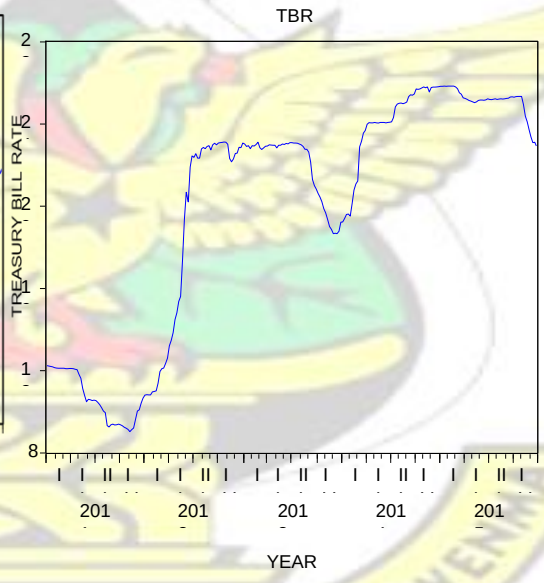
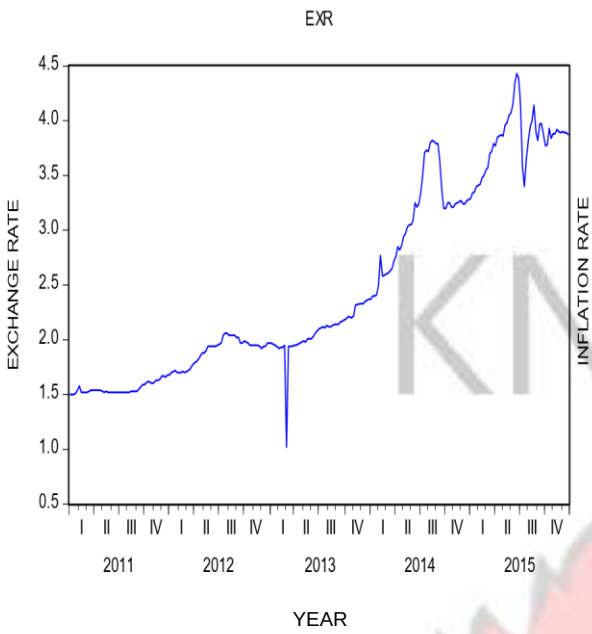


Fig. 4.2 Time Series Plot of TBR



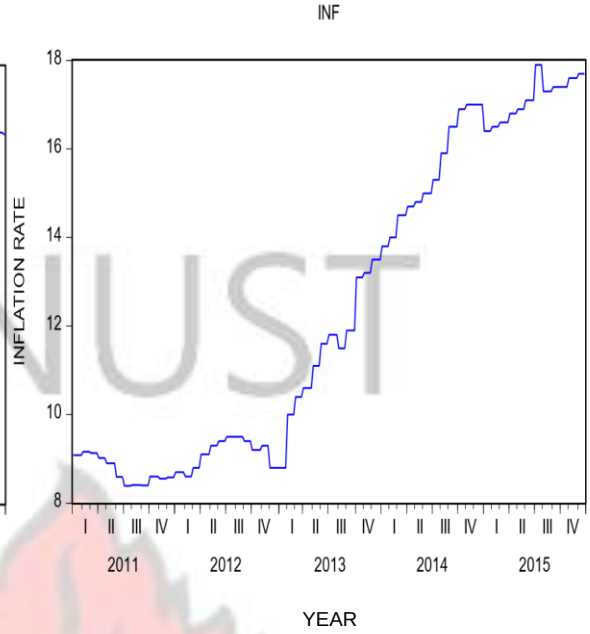


Fig. 4.3 Time Series Plot of EXR *Fig. 4.4 Time Series Plot of INF*

From the graphs above it can be seen that all the time series data variable are all going up or increasing. The GSE-CI (in figure 4.1) had some reduction in 2011 and 2012. It however recovered and increased significantly in 2013. It again had mixed trend in 2014 and 2015. The nature of the trend in figure 4.1 shows that the stock returns on Ghana Stock Exchange faced some uncertainties. A brief look at the graphs shows that the theory that as interest rate increase, stock prices on average reduce is to some extent true in the case of Ghana.

For Treasury bill rate (Fig. 4.2), the first three quarters of the year 2011 show that as the Treasury bill rate reduced, the GSE-CI increased. As the TBR had fast increase in 2012 the GSE-CI had a stable trend for the same period. As it can be seen, when the TBR got stable in 2012 and further reduced in 2013, the GSE-CI increased tremendously for the same period. The trend in 2015 between GSE-CI and TBR followed similar expectation. On the money market, the 91-day and 182-day Treasury bill rates declined to 9.6 and 10.8 per cent respectively in November 2011 from 12.3 and in December, 12.7 per cent respectively.

The rates on the 1-year note also declined by 140 basis points from the beginning of the year to 11.3 per cent in November 2011, while the 2-year fixed note rates went down by 60 basis points to12.1 per cent over the same period. Interest rate trends stabilized between July and September 2012. During this period, rates on 91-day treasury bills rose to 23.1percent from 22.8 percent, while 182-daybills rates remained at 22.9 percent.1-year fixed note increased from 22 percent to 22.5 percent. The 2-year fixed note stayed put at 23 percent3-year fixed note was also stable at 24 percent, while 5-year bonds declined to 23 percent from 26percent. Interest rates have generally trended up on the money markets between December 2013 and February 2014, reflecting movements in the policy rate: The 91-day instrument increased to 23.5 percent from 19.2 percent. Similarly, the 182-day increased to 21.2 percent from 18.7 percent.

The trend for GSE-CI as compared to EXR (as shown in Fig 4.3) followed the same result in the GSE-CI and TBR. As EXR increased, the GSE-CI also increased with similar margin although it was not of the same margin.

The inflation rate graph (Fig. 4.4) shows that from 2011 as the inflation rate reduced, the stock return increased but as the inflation rate increased marginally in 2012, the GSE-CI increased marginally. As the inflation rate increased further in 2014 and 2015, the GSE-CI reduced in the same period.

It shows how all the variables have been increasing over the period. I therefore check whether the variables are stationary or not so that I can proceed in running the model with it. Interest rates have broadly trended downwards throughout the year.

4.2 UNIT ROOT TEST

Before testing for the existence of a co-integrating relationship in the GSE-CI and other variables, Unit Root testing must be done to examine the stochastic properties of each data series that are being used in this research. It could be seen from the graphs above that all the line for the variables under consideration; GSE-CI, TBR, EXR and INF are gradually moving up. This is probably due to their non-stationarity, or the variables are said to have Unit Root.

To prove whether it is stationary or not the correlogram has to be checked by using the Ljung Box statistics. The lag was automatically selected by the software for the Unit Root testing. The correlogram of the variables GSE-CI, TBR , EXR and INF proves that all the variables are non stationary. The first difference of the variable has to be checked to see if the variable will become stationary or not.

To make it possible to use these data to run a model, they have to be changed into stationary data. This was done by running the first difference of the data for all the variables. The results of the data series at level and a first difference is shown in Table 4.1 below. The unit root test presented in Table 4.1 below shows that all the data series were not stationary at level but became stationary at first difference. For example with LnGSE-CI the P-Value at level was 65.7%, 96.7%, 95.0% at constant, constant and linear trend and none respectively, with their corresponding Critical values (absolute) greater than the test values.

	TYPE OF TEST	VARIABLE	DETERMINISTIC TERM	TEST VALUE	CRITICAL VALUES			P. VALUE
					1%	5%	10%	
LEVEL	ADF TEST	LnGSE-CI	CONSTANT	-1.239	-3.455	-2.872	-2.572	0.657
			CONST & TREND	-0.757	-3.994	-3.427	-3.136	0.967
			NONE	1.297	-2.573	-1.942	-1.615	0.950
		LnTBR	CONST	-1.648	-3.455	-2.872	-2.572	0.456
			CONST & TREND	-1.861	-3.994	-3.427	-3.137	0.671
			NONE	0.448	-2.574	-1.942	-1.615	0.810
		LnEXR	CONSTANT	-0.581	-3.455	-2.872	-2.572	0.871
			CONST & TREND	-2.881	-3.994	-3.427	-3.136	0.170
			NONE	1.533	-2.573	-1.942	-1.615	0.969
		LnINF	CONSTANT	0.241	-3.455	-2.872	-2.572	0.974
			CONST & TREND	-2.291	-3.993	-3.427	-3.136	0.4367
			NONE	2.900	-2.573	-1.942	-1.615	0.9992
FIRST DIFFERENCE	ADF TEST	LnGSE-CI	CONSTANT	-6.922	-3.455	-2.872	-2.572	0.0000
			CONST & TREND	-6.994	-3.994	-3.427	-3.136	0.0000
			NONE	-6.777	-2.573	-1.942	-1.615	0.0000
		LnTBR	CONSTANT	-3.860	-3.455	-2.872	-2.572	0.0027
			CONST & TREND	-3.914	-3.994	-3.427	-3.137	0.0128
			NONE	-3.810	-2.574	-1.942	-1.942	0.0002
		LnEXR	CONSTANT	-16.730	-3.455	-2.872	-2.572	0.0000

		CONST & TREND	-16.699	-3.994	-3.427	-3.136	0.0000
		NONE	-16.540	-2.573	-1.942	-1.615	0.0000
	LnINF	CONSTANT	-16.559	-3.455	-2.872	-2.572	0.0000
		CONST & TREND	-16.585	-3.993	-3.427	-3.136	0.0000
		NONE	-16.062	-2.573	-1.942	-1.615	0.0000

Table 4.1: Unit Root Test for GSE-CI, TBR, EXR and INF.

To ascertain whether or not the variables were integrated or not, I carried out the ADF test at first difference. The results shown in table 4.1 indicate that all the variables GSE-CI, TBR, EXR and INF were stationary at first difference, meaning that they all had no unit root and represented a stable series.

These indicate that at level, we cannot reject the null hypothesis that says that LnGSE-CI has a unit root (in other words is non-stationary). This is the case for the all the other time series data for LnTBR, LnEXR and LnINF. But the first difference made the data stationary. The absolute values of ADF test statistics for all the variables under consideration were also found to be greater than their corresponding test critical values at 5%. This implies that all the values has no unit root at first difference. Their P-values at 0.0000 and corresponding critical values less than test values in the case of LnGSE-CI show that we reject the null hypothesis that the data has unit root but accept alternate hypothesis that says that data has no unit root. This means that data to be used to run regression model will be the first difference data to avoid spurious result and wrong estimated coefficients and interpretations. If this is not done the standard errors could be wrong and this can affect the predictive power of the results. Hence I conclude that at first difference all the variables represented a stationary series integrated of the first order

After the first difference was run on the data the results gotten is presented in a graphical state bellow.

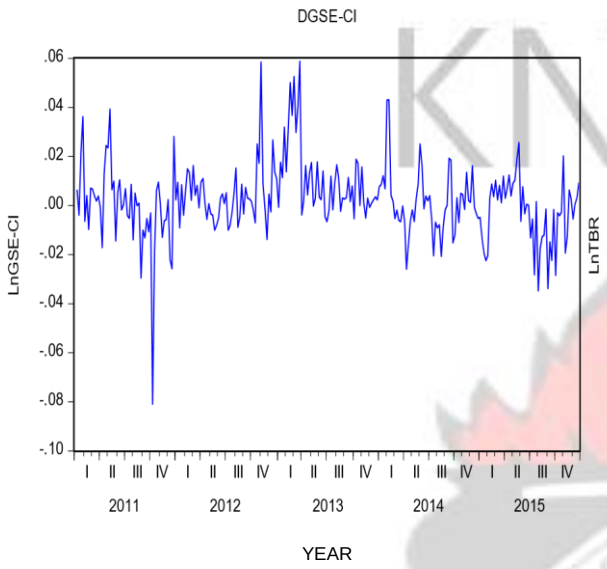


Fig. 4.5 First difference graph GSE-CI

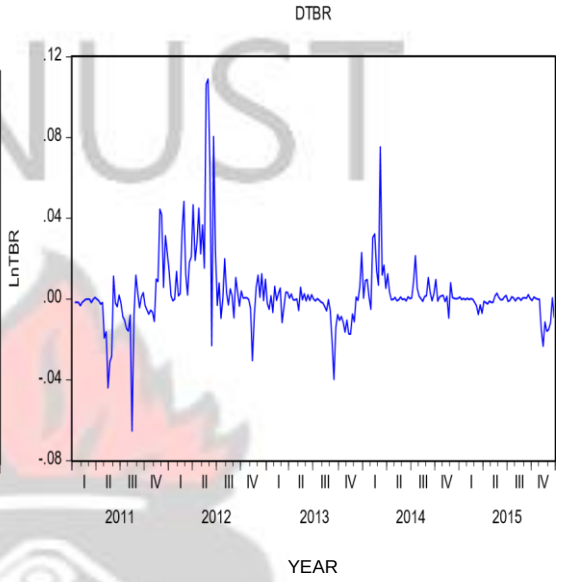


Fig. 4.6 First difference graph TBR

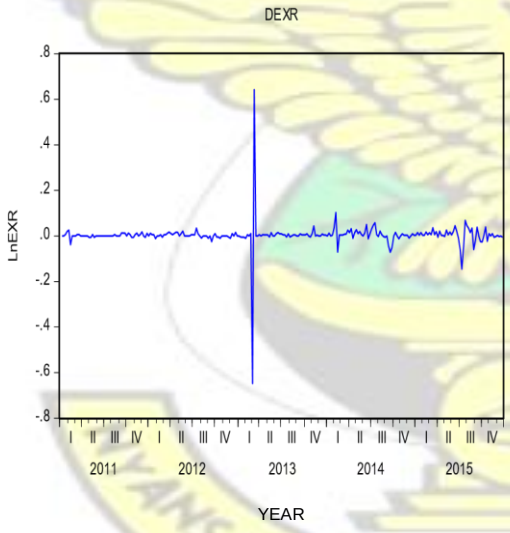


Fig. 4.7 First difference graph EXR

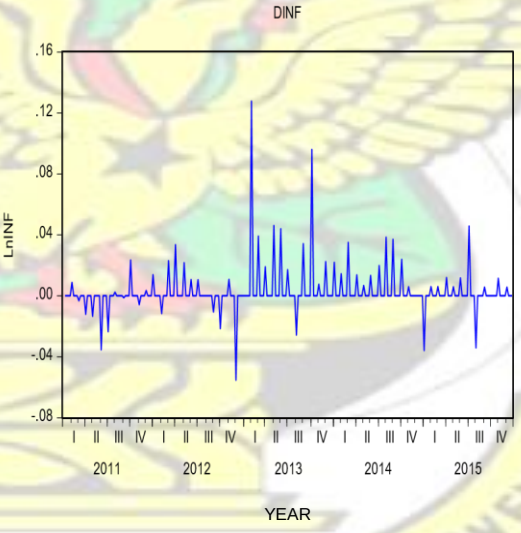


Fig. 4.8 First difference graph INF

It can be seen from the graphs in Figures 4.5, 4.6, 4.7 and 4.8 that the variables have been made stationary after first difference. This is evident in the seemingly straight lines lying on the 0. So the figures to be used to run the VECM will be the first difference figures.

4.3 CO-INTEGRATION TEST RESULTS

The lag length from the VAR lag order Selection criteria shows that the maximum number of lags to be used for the Johansen Co-integration Test and VAR models should be 6. This is shown the Table 4.2. LR, FPE and AIC are asking for the use of 6 lags for the system equation models.

Endogenous variables: LNGSE-CI LNTBR

LNEXR LNINF

Exogenous variables: C

Included observations: 253

Lag	LogL	LR	FPE
0	379.2324	NA	6.05e-07 -
1	2479.791	4118.091	4.22e-14 -
2	2557.934	150.7261	2.58e-14 -
3	2575.487	33.30350	2.55e-14 -
4	2587.829	23.02539	2.63e-14 -

					AIC	SC	HQ
					2.966264	-2.910400	-2.943788
5	2628.154	73.95478	2.17e-14	6	19.44499	-19.16567	-19.33261
	2647.657	35.15254*	2.11e-14*	-	19.93623	-19.43346*	-19.73395*
7	2651.247	6.356276	2.33e-14	-	19.94852	-19.22229	-19.65633
8	2654.360	5.413952	2.59e-14	-	19.91960	-18.96991	-19.53751
					20.11189	-18.93875	-19.63989
					20.13958*	-18.74299	-19.57768
					20.04148	-18.42142	-19.38968
					19.93960	-18.09610	-19.19790

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Table 4.2Var Lag Order Selection

After determining whether the data is stationary or not, and the lag length to be used for the system model, the long run relationship of the variables was determined using the Johansen Test of Co-integration. In order to detect the cointegration relationship between the variables, the Johansen-Juselius procedure was implemented. Table 4.3 and 4.3 below indicate that trace statistics points show one cointegrating relationship which indicates the presence of a long-run equilibrium relationship between the variables. The results are in

Table 4.3 and 4.4 below

Trend assumption: Linear deterministic trend

Series: LNGSE-CI LNTBR LNEXR LNINF

Lags interval (in first differences): 1 to 6

Table 4.3 Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
one * N	0.093359	50.88105	47.85613	0.0253
At most 1	0.054984	25.98695	29.79707	0.1291
At most 2	0.040635	11.62245	15.49471	0.1760
At most 3	0.004265	1.085592	3.841466	0.2974

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Table 4.4 Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
one N	0.093359	24.89410	27.58434	0.1064
At most 1	0.054984	14.36450	21.13162	0.3359
At most 2	0.040635	10.53686	14.26460	0.1790
At most 3	0.004265	1.085592	3.841466	0.2974

Max-eigenvalue test indicates n o cointegrati on at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table 4.3 and 4.4 depict the results of co-integration tests that are included in the equation model. It is seen from the trace test that there exist at least one co-integration between the data series. That is Trace test indicates 1 cointegrating equation at the 0.05 level. But the Max-eigenvalue test indicates no cointegration at the 0.05 level. The result from the trace test was chosen over the Max-eigenvalue test. This implies that the variables included in this model have association in the long run and that short run deviations will be corrected towards equilibrium. Also the cointegration means that there is at least a unidirectional causality among the data series. The researcher therefore can determine the appropriate model to be used to identify the long-run determinants of the equilibrium Ghana Stock Exchange Composite Index.

4.4 LONG RUN AND SHORT RUN EQUILIBRIUM

4.4.1 LONG TERM EQUILIBRIUM

Dependent Variable: D(LnGSE-CI)

VARIABLE	COEFFICIENT	T STATISTIC	STANDARD ERROR
LnTBR	-0.227933	-2.16847	0.10511
LnEXR	0.835335	3.26927	0.25551
LnINF	-1.778733	-6.21356	0.28627
CONSTANT	-3.009588		

Table 4.5 Long Run Estimates of the impact of TBR, EXR and INF on GSE-CI

The results from the long run estimates indicate that Treasury Bill Rate, Exchange Rate and Inflationary Rate all have their estimated coefficients carrying their expected signs and were statistically significant as their t-statistics shows. This confirms the researcher's prior expectations that there will be a negative relationship between TBR and GSE-CI and between INF and GSE-CI but a Positive relationship between EXR and GSE-CI

The model can be written differently in mathematical form as stated below:

Ln(GSE-CI) = 3.00958 – 0.227933LnTBR + 0.835335LnEXR – 1.778733LnINF… eqn 4.1

It can be seen from the results above that a 10% increase in Treasury Bill Rate results in corresponding decreases in average stock returns by about 2.3%. This confirms Hardouvelis (1987), Alan and Uddin (2009), who pointed out that there exist an inverse relationship between stock prices and changes in interest rates. The results clearly show a negative relationship between GSE-CI and TBR.

The result is not out of place when activities of the government during the period are considered. In 2013, a budget deficit of GHC 3.4 billion (3.8% GDP) was realised in the first four months of the year 2013 as against a target of GHC 2.7 million (3% of GDP). The deficit was financed mainly from domestic sources resulting in a Net Domestic Finance (NDF) of GHC 2.7 million higher than the budget target of GHC 2.2 billion.

This might have accounted for the reason why the 91 day Treasury bill rate went higher in the period of 2013 to 2015. This resulted in the lower volume and value of stock on the exchange because the TBR seemed lucrative for investors than stock investment. To check the impact of only TBR on GSE-CI, the other two variables (EXR and INF) are removed from the estimation of the equation to get a new equation as:

VARIABLE	COEFFICIENT	T STATISTICS	STANDARD ERROR

LnTBR	-0.821199	-3.252701	0.25247
Constant	-4.950884		

Table 4.6 Long Run Estimates of impact of TBR on GSE-CI

LnGSE-CI = 4.950884 – 0.821199TBR…… eqn 4.2

This implies the effect of changes in the Treasury bill rate (when considered as the only macroeconomic variable that affect stock return) on stock return in Ghana is that when TBR increased by 10% the GSE-CI reduce by about 8% as compared to 2.7% when the other two variables are considered together with it.

It also indicates that in the long run, there is a depreciating impact of inflation rate on the stock prices in Ghana. This could be interpreted as a 10% inflation resulted in about 18% decrease in the average stock prices. This is in agreement with Fama (1981), who argues that expected inflation is negatively correlated with anticipated real activity, which in turn is negatively related to returns on the stock market. This was expected because inflation causes a reduction in the overall purchasing power of consumers and investors. This results in the reduction of the amount of money that could be used to invest in stocks. Inflation seemed to be on the good side (9.08%) from the beginning of the year 2011 but it increased steadily that during the period under consideration it increased to 17.7%. To check the impact of only inflation on GSE-CI, the other two variables (EXR and TBR) are removed from the

estimation of the equation to get a new estimate as:

VARIABLE	COEFFICIENT	T STATISTICS	STANDARD ERROR
LnINF	-0.989205	-5.79959	0.17056
Constant	-4.920987		

Table 4.7 Long Run Estimates of impact of INF on GSE-CI

The equation therefore becomes: ***LnGSE-CI = 4.920987 -0.989205INF…eqn 4.3***

This means that when inflation is the only variable that is considered in determining changes in the stock return in Ghana, the GSE-CI reduced by about 9.9% when inflation increased by 10% or the GSE-CI increased by about 9.9% when inflation reduced by 10%. When all the other two variables were in the equation estimation its impact was 18% on GSE-CI.

But there was a positive relationship between the Exchange Rate (Cedi to Dollar rate) and stock prices in Ghana. As the exchange rate increased by 10%, the stock returns also increase by about 8.4%. This findings is in agreement with the result with of Kuwornu and OwusuNantwi (2011) and the flow theory by Dornbusch and Fisher (1980) which states that a appreciation of the domestic currency will make a company's product at the international market expensive resulting in the decline of profits which intend will cause the stock price to fall because the company's competitiveness in the industrial it serves will reduce. The reverse in the explanation above is the case of Ghana where the cedi depreciated throughout the period of the research. This the researcher expected the positive relationship because a depreciation of the cedi is favourable to firms who export on the stock market because it gives the companies more profit and this, according to Efficient Market Hypothesis, will cause investors to buy more of the shares of the company resulting in the higher stock prices. This finding goes contrary to the research of Khan etal (2012) and Dimitrova (2005). Their results showed that a depreciation of the currency negatively affects the stock market and an appreciation would boost the stock market.

The above may be due to the government policy to tighten credit conditions in the years 2011 to 2015. The bank of Ghana monetary committee press release pointed out that there was a general net tightening of credit conditions with the exception of consumer credit which saw

easing in the credit stance but for all other loan types including SMEs, large enterprises, short term and long term loans were tightened in the period.

This meant cost of borrowing was higher in 2013 and 2014 which could have negative effect on large firms listed on the stock exchange financially in the sense that it will reduce their profit. So firms listed on the stock exchange had to go for an option of raising funds on the GSE. This was so in the case of Ghana since in the period from June 13, 2004 and March 28, 2014, 11 companies offered shares for sale in the form of primary issue, initial Public Offering (IPO) and Rights Issue.

Mr Benjamin Amoah, Head of Financial Stability at the Bank of Ghana, said in a press briefing that Ghana's investment requirements far exceed the levels of domestic savings needed to finance them and in such an environment, current account deficits are natural occurrences which put pressure on the domestic currency to depreciate. All the above mentioned factors may have caused the depreciation of the cedi which intend had an influence on the stock prices. The Government of Ghana raised bonds to the tune of 5109.32 million Cedis and 7121.57 Million Cedis in 2013 and 2014. This bonds were largely bought by foreign investors. This could cause the exchange rate to rise up, that is to say, the Cedi could depreciation of the Dollar. But although this may be the case the GSE-CI had increase during the period. It suggests that the Ghana's stock market is dominated by foreign investors and that the few foreign currencies that gets into the country normally passes through the stock market. So the depreciation of the cedi, caused by higher demand of the dollar mainly by the government, resulted in higher stock investment.

To check the impact of only exchange rate on GSE-CI, the other two variables (INF and TBR) are removed from the estimation of the equation to get a new estimate as:

VARIABLE	COEFFICIENT	T STATISTICS	STANDARD ERROR
LnEXR	-1.160351	-4.8005	0.24171
Constant	-6.380908		

Table 4.8 Long Run Estimates of impact of EXR on GSE-CI

The equation of the impact of only exchange rate on stock return in Ghana would therefore be:

LnGSE-CI = 6.380908 – 1.160351EXR…..eqn 4.4

This can be interpreted as a 10% change in exchange rate results in about 11.6% negative change in GSE-CI. So if the EXR increased by 10% the GSE-CI will reduced by about 11.6%. But if the GSE-CI reduced by about 11.6% it was as a result of an increase in EXR by 10%. This confirms the findings of Khan etal (2012) and Dimitrova (2005). Their results showed that a depreciation of the currency negatively affects the stock market and an appreciation would boost the stock market. This should not be confused with the above findings that there was a positive relationship between stock return and the exchange rate between the cedi and the dollar. This is because the former finding shows the estimate when only the EXR is considered without any other macroeconomic variable in the equation. It means investors will go for exchange rate portfolio when the Cedi depreciate against the Dollar whiles they will invest more in stocks and bonds on the GSE when the Cedi appreciate against the dollar. This is understandable since Ghana's economy is import dominated. The flow theory by Frank and Young (1972) states that changes in the exchange rate shows up a profit or loss on the multinational firm's books which affects its share price. When exchange rate appreciates, exporters will be negatively affected. An appreciation of the currency will cause their goods and services to dearer on the international market. This will cause their exports to decline because the prices of the goods will be expensive to buyers on the international market resulting

in decrease in profit. If the firm losses profit, their competitiveness on the domestic market will decline and this will result in decrease in value of stock prices. Since the economy is import dominated the opposite will apply for an economy that is import dominated like Ghana.

Variable	Coefficient	T Statistic	Standard Error
LnTBR	-1.415318	-2.95206	0.47943
LnEXR	0.535156	1.04176	0.51370
Constant	-3.656842		

Table 4.9 Long run estimate of impact of LnTBR and LnEXR on LnGSEI-CI

LnGSE-CI = 3.656842 – 1.415318LnTBR + 0.535156LnEXR……...eqn 4.5

When inflation is taken out of the equation it can be deduce that in the long run a 10% change in Treasury bill rate will cause a negative change in the GSE composite index to about 14% ceteris paribus. This implies that if Treasury bill increases by 10%, the GSE composite index will reduce by 14% while a 1% reduction in the inflation will result in a 1.4% increase in the GSE composite index. The exchange rate, on the other hand, had positive effect on the stock return in Ghana. A 1% increase in the exchange rate will cause GSE composite index to increase by0.535%. The impact of inflation in the constant in as compared toTable 4.5 above is 0.647.

Variable	Coefficient	T Statistic	Standard Error
LnTBR	0.000219	0.00138	0.15936
LnINF	-0.96236	-4.64668	0.20711
Constant	-4.990872		

Table 4.10 Long run estimate of impact of LnTBR and LnINF on LnGSEI-CI

LnGSE-CI = 4.990872 + 0.000219LnTBR – 0.96236LnINF……eqn 4.6

Considering stock return in Ghana with only Treasury bill rate and inflation as macroeconomic variable that affect the movement of the GSE-CI shows that, a 10% increase in TBR causes GSE-CI to change by 0.00219% in a positive way ceteris paribus. This is very insignificant change impact. Inflation, however, had negative effect with GSE-CI. If inflation increase by 100%, with TBR held constant, the GSE-CI will reduce by 96.23% and vice versa. The impact of Treasury bill rate in the constant is 1.33 when compared to that in Table 4.5.

Variable	Coefficient	T Statistic	Standard Error
LnEXR	1.121980	0.27826	4.03215
LnINF	-2.422949	-7.24994	0.33420
Constant	-2.331054		

Table 4.11 Long run estimate of impact of LnEXR and LnINF on LnGSEI-CI

LnGSE-CI = 2.331054 + 1.121980LnEXR – 2.422948LnINF……..eqn4.7

The result in table 4.11 above shows that exchange rate again had a positive effect on the GSE-CI when TBR is taken off the model. It shows that a 100% change in the exchange rate will cause GSE-CI to move in the same direction by 112% when all other variable held constant. The change in the GSE-CI as a result of a change in the inflation rate was having a negative direction. If the inflationary rate goes up by 10% the GSE-CI will reduce by24 and vice versa (ceteris paribus). The impact of TBR in determining the constant is a reduction by 0.678.

4.4.2 SHORT TERM EQUILIBRIUM

Dependent Variable: D(LNGSE-CI)
Method: Least Squares

Included observations: 254 after adjustments				
	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000322	0.000983	0.328015	0.7432
RES(1)	-0.018885	0.008692	-2.172638	0.0308*
D(LNGSE-CI(-1))	0.341380	0.065392	5.220499	0.0000*
D(LNGSE-CI(-2))	0.174284	0.068839	2.531767	0.0120*
D(LNGSE-CI(-3))	-0.034818	0.068936	-0.505080	0.6140
D(LNGSE-CI(-4))	0.045307	0.067763	0.668609	0.5044
D(LNGSE-CI(-5))	0.066977	0.067166	0.997175	0.3197
D(LNGSE-CI(-6))	0.080760	0.064412	1.253809	0.2112
D(LNTBR(-1))	-0.000210	0.059712	-0.003524	0.9972
D(LNTBR(-2))	0.007764	0.063462	0.122345	0.9027
D(LNTBR(-3))	-0.032895	0.062492	-0.526385	0.5991
D(LNTBR(-4))	0.027849	0.062808	0.443391	0.6579
D(LNTBR(-5)))	-0.079736	0.063877	-1.248272	0.2132
D(LNTBR(-6))	0.009219	0.060523	0.152317	0.8791
D(LNEXR(-1))	0.023934	0.020607	1.161437	0.2467
D(LNEXR(-2))	0.007511	0.021362	0.351587	0.7255
D(LNEXR(-3))	-0.038675	0.020922	-1.848517	0.0658
D(LNEXR(-4))	0.009507	0.020407	0.465887	0.6417

D(LNEXR(-5))	0.016217	0.019696	0.823346	0.4112
D(LNEXR(-6))	-0.010428	0.016874	-0.617976	0.5372
D(LNINF(-1))	0.054786	0.061171	0.895616	0.3714
D(LNINF(-2))	0.077113	0.060418	1.276313	0.2031
D(LNINF(-3))	0.041993	0.059983	0.700072	0.4846
D(LNINF(-4))	0.079638	0.059871	1.330159	0.1848
D(LNINF(-5))	-0.011197	0.066103	-0.169392	0.8656
D(LNINF(-6))	-0.015756	0.068142	-0.231215	0.8174
R-squared	0.329549	Mean dependent var		0.002366
Adjusted R-squared	0.256035	S.D. dependent var		0.015267
S.E. of regression	0.013168	Akaike info criterion		-5.725264
Sum squared resid	0.039537	Schwarz criterion		-5.363174
Log likelihood	753.1085	Hannan-Quinn criter.		-5.579599
F-statistic	4.482788	Durbin-Watson stat		1.997997
Prob(F-statistic)	0.000000			
Table 4.12 Short run Esti	**ıates of VECM**			

As it is seen in the model in table 4.6 above, the coefficient of the error correction term is negative (-0.018885) with P. value 0.0308. This shows that there is long-run causality from the independent variables: LnTBR, LnEXR, LnINF to the dependent variable: LnGSE-CI. The coefficient being negative makes it significant because it shows the speed of adjustment. That is to say any disequilibrium towards long-run equilibrium state is going towards equilibrium at 1.89% though slow. The short run coefficients from D(LnGSE-CI(-1)) to D(LnINF(-6)) shows that individually the different lags of Treasury Bill Rate, Exchange Rate and Inflation Rate does not significantly influence the changes in the Stock returns. It is therefore needed that I run a Wald Test to see if the variables can jointly affect LnGSE-CI or not. D(LnGSE-CI(-1)) and D(LnGSE-CI(-2)) are all significant at 5% level with D(LnEXR(-3)) being significant at 10% level. The error term was also significant at 5% level. In all four short term variable at different lags are significant.

The value of the R^2 0.3295 implies that about 32.95% of the variations in GSE-CI are explained by the independent variables. This shows a lower explanatory power of the model but is in the range of most of the empirical results like Greetha et al (2011) who got 0.184 for Malaysia, 0.132 for USA, 0.215 for China and Talla (2013). The F-statistic at 4.482788 explains that the coefficients of the variables are not zero. It is significant at 5% level with probability value of 0.000. This means that all independent variables: Treasury bill rate, Exchange rate and inflation rate jointly can the dependent variable which is Ghana stock exchange composite index. The Durbin-Watson Statistic as indicated from Table 4.6 as 1.997 gives an indication that there is no auto-correlation between the variables.

4.5 TESTING THE JOINT VARIABLE EFFECT ON STOCK RETURNS

Variable	Test Statistics	Value	Df	Probability
LnTBR	F-statistic	0.399568	(6, 228)	0.8789
	Chi-square	2.397410	6	0.8798
LnEXR	F-statistic	2.349357	(6, 228)	0.0320
	Chi-square	14.09614	6	0.0286
LnINF	F-statistic	0.704537	(6, 228)	0.6462
	Chi-square	4.227223	6	0.6460

Table 4.13 Results Wald Test

From table 4.7 above it can be seen that LnTBR jointly can influence LnGSE-CI. The probability value of the chi-square at 87.98% shows that D(LnTBR(-1)) to D(LnTBR(-6)) jointly influence changes in the stock returns in Ghana in the short run. The same goes with LnINF in the sense that the P value of 64.60% proves that. But the joint variables of LnEXR cannot jointly influence changes in LnGSE-CI as proven from the P value of the Chi-square of 2.86%. So this means that TBR will influence GSE-CI return in the short run jointly and significantly but not at their individual lags. Also INF will influence GSE-CI return in the short run jointly and significantly but not at their individual lags. However this cannot be said of the EXR. In its individual lags it cannot influence GSE-CI in the short run. Likewise it cannot influence it Jointly in the short run.

4.6 VARIANCE DECOMPOSITION BETWEEN THE DEPENDENT VARIABLES

AND INDEPENDENT VARIABLES

The analysis of the variance decomposition is presented below to examine the shock or impulse in the variations in the variables to the fluctuations in the GSE-CI. 52 periods were used to see the shock effect for a full year since our data is weekly. The examination of the extent to which shocks in the four variables account for the fluctuation is discussed below:

Period	S.E.	DLNGSEI	DLNTBR	DLNEXR	DLNINF
1	0.013275	100.0000	0.000000	0.000000	0.000000
2	0.014068	99.71402	0.009579	0.002619	0.273784
3	0.014682	98.78331	0.025192	0.232186	0.959316
4	0.015047	95.48115	0.065925	3.132167	1.320758
5	0.015249	94.58702	0.243956	3.055034	2.113985
6	0.015435	94.49318	0.422461	3.000004	2.084358
7	0.015644	94.24951	0.412361	3.067073	2.271058
8	0.015800	93.41163	0.406100	3.025621	3.156653
9	0.015880	93.42422	0.407318	3.001202	3.167265
10	0.015905	93.39852	0.420533	3.008528	3.172415
11	0.015952	93.21264	0.427122	2.993515	3.366727
12	0.015975	93.18818	0.444483	3.001605	3.365736
13	0.015994	93.14297	0.446075	2.995613	3.415346
14	0.016011	93.14461	0.454868	2.989059	3.411467
15	0.016020	93.12908	0.458989	2.991945	3.419990
16	0.016027	93.10569	0.459984	2.989498	3.444826

17	0.016031	93.10562	0.460666	2.989264	3.444448
18	0.016034	93.10338	0.461759	2.988585	3.446278
19	0.016037	93.09763	0.463387	2.987565	3.451418
20	0.016039	93.09611	0.464487	2.987914	3.451488
21	0.016040	93.09361	0.464515	2.987581	3.454294
22	0.016041	93.09313	0.465198	2.987271	3.454399
23	0.016041	93.09220	0.465718	2.987328	3.454754
24	0.016042	93.09104	0.465901	2.987181	3.455875
25	0.016042	93.09089	0.466123	2.987134	3.455851
26	0.016042	93.09062	0.466256	2.987099	3.456021
27	0.016043	93.09030	0.466430	2.987044	3.456225
28	0.016043	93.09014	0.466545	2.987057	3.456254
29	0.016043	93.09002	0.466592	2.987038	3.456354
30	0.016043	93.08995	0.466665	2.987023	3.456363
31	0.016043	93.08988	0.466721	2.987023	3.456380
32	0.016043	93.08981	0.466752	2.987016	3.456424
33	0.016043	93.08978	0.466782	2.987014	3.456423
34	0.016043	93.08976	0.466802	2.987012	3.456430
35	0.016043	93.08973	0.466821	2.987010	3.456437
36	0.016043	93.08972	0.466835	2.987010	3.456438
37	0.016043	93.08971	0.466843	2.987009	3.456441
38	0.016043	93.08970	0.466852	2.987009	3.456441
39	0.016043	93.08969	0.466858	2.987009	3.456441

40	0.016043	93.08969	0.466863	2.987008	3.456443
41	0.016043	93.08968	0.466866	2.987008	3.456442
42	0.016043	93.08968	0.466869	2.987008	3.456442
43	0.016043	93.08968	0.466871	2.987008	3.456442
44	0.016043	93.08968	0.466873	2.987008	3.456442
45	0.016043	93.08968	0.466874	2.987008	3.456442
46	0.016043	93.08967	0.466875	2.987008	3.456442
47	0.016043	93.08967	0.466875	2.987008	3.456442
48	0.016043	93.08967	0.466876	2.987008	3.456442
49	0.016043	93.08967	0.466876	2.987008	3.456442
50	0.016043	93.08967	0.466877	2.987008	3.456442
51	0.016043	93.08967	0.466877	2.987008	3.456442
52	0.016043	93.08967	0.466877	2.987008	3.456442

Table 4.14 Variance Decomposition of DLnGSEI-CI

In the short run, the first period shows that a shock or an impulse to GSE-CI account for 100% variation of the fluctuation in GSE-CI. So in the first week shocks to TBR, EXR and INF do not account for any variation of the fluctuation in the GSE-CI. Therefore the shock in the GSE-CI contribute to the total fluctuation in the GSE-CI itself (own shock). In the second week, shock to GSE-CI account for 99.71 percent variations of the fluctuations in the GSE-CI whiles shock in the TBR and EXR account 0.0095 percent and 0.0026 percent variations of the fluctuation in the GSE-CI respectively. Inflationary shock also contributed to 0.27 percent variation of the fluctuations in the GSE-CI.

In the third week, impulse to GSE-CI account for 98.71 percent variations of the fluctuations in the GSE-CI, shock to Treasury bill rate contributes to the variations of the fluctuations in the GSE-CI by 0.025 percent. The shock to EXR and INF variations of the fluctuations in the GSE-CI were 0.232 percent and 0.959 percent respectively. So we predict or forecast that in the third week, shock in any of the independent variables will account for a fluctuation in the GSE-CI at a rate that is not more than 1 percent. Rather it is GSE-CI own shock that move investors to respond to and or purchase the shares on Ghana Stock Exchange. The same can be said of the fourth week and so on.

As the weeks go further forward in the 52nd the contribution of shocks in the independent variables to the fluctuations in the GSE-CI increases marginally whiles own shock reduces marginally. For example own shock accounts for 93.089 percent variation of the fluctuations in the stock returns in Ghana. The shock in the TBR, EXR and INF contribute 0.466 percent, 2.987 percent and 3.456 percent variations of the fluctuations in the stock return.

In all it can be concluded that own shock is the main determinant of the fluctuations in the stock return on the GSE whiles the independent variables have an insignificant effect on the in the stock return GSE.

4.7 CAUSALITY BETWEEN THE DEPENDENT VARIABLE AND THE INDEPENDENT VARIABLES.

In the regression model above the dependent variable, GSE-CI and the independent variables TBR, EXR and INF, have some relationships but this does not necessarily mean that these variables are causally related. In other words it does not necessarily mean TBR causes GSECI or EXR causes GSE-CI or INF causes GSE-CI or even the dependent variable causes the

various independent variables. One thing noteworthy is that regression does not necessarily imply causation. Causality must be justified or inferred or from theory that underlies the phenomenon that is tested empirically. The causality between the variables under study are therefore examined below:

Dependent variable: DLNGSEI			
Excluded	Chi -sq	Df	Prob.
DLNTBR	1.499107	6	0.9596
DLNEXR	14.92507	6	0.0208
DLNINF	3.387640	6	0.7589
All	20.84092	18	0.2875

Table 4.15 VAR Granger Causality fr om the independent variables to GSE-CI

The null hypothesis in the result, in table 4.17, is that DLntBR does not Granger cause DLnGSE-CI. The null hypothesis cannot be rejected since the probability value is more than 5 percent that is 95.96 percent. So there is no unidirectional causality from treasury bill rate to the GSE returns in Ghana. Table 4.18 (in the appendix) also shows that GSE-CI does not granger cause TBR. The null hypothesis shows states that DLnGSE-CI does not Granger cause DLnTBR. The probability value is 38.63 percent which id more than 5 percent so we cannot reject the null hypothesis. This means GSE-CI does not Granger cause treasury bill rate. So there is no directional (whether unidirectional or bi-directional) causality between the GSE-CI and treasury bill rate.

With exchange rate, table 4.17 shows that exchange rate Granger cause GSE-CI in Ghana. The null hypothesis that DLnEXR does not Granger cause DLnGSE-CI can be rejected at 5 percent significant level of 2.08 percent. But there was no causality from the direction of GSE-CI to EXR as the null hypothesis that DLnGSE-CI does not Granger cause EXR is accepted due to its P value is 53.53 percent. So GSE-CI does not Granger cause EXR. The conclusion is that there is unidirectional causality from EXR to GSE-CI.

Lastly, inflation does not Granger cause stock return and stock returns does not Granger cause inflation. Table 4.17 shows that the P value is 75.89 percent so we accept the hypothesis that DLnINF does not Granger cause DLnGSE-CI. Also in table 4.20, the null hypothesis that DLnGSE-CI does not Granger cause DLnINF cannot be rejected since its P value is at 26.49 percent. So the is no directional causality between GSE-CI and INF.

4.8 DIAGNOSTIC TESTS

To determine the viability of the model used in predicting the effect of macroeconomic variables on the return on the stock traded on the GSE, tests were conducted. Among the tests conducted are the serial correlation test, heteroskasticity test and the normality test.

4.8.1 SERIAL CORRELATION TEST

Table 4.16 Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.205654	Prob. F(2,226)	0.8143

Obs*R-squared	0.461426	Prob. Chi-Square(2)	0.7940

The serial correlation test in the Breusch-Godfrey Serial Correlation LM Test above shows that there is no serial correlation in the model that is being used to predict the outcome of the effect of macroeconomic variables on stock return in Ghana. The null hypothesis is that there is no serial correlation in the model. The Prob, Chi-Square(2) value at 74.40% is more than 5%and this shows that we cannot reject the null hypothesis that there is no serial correlation.

Therefore there is no serial correlation in the model which is a good sign for our research.

4.8.2 HETEROSKASTICITY TEST

Table 4.17 Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.646882	Prob. F(28,225)	0.9153
Obs*R-squared	18.92383	Prob. Chi-Square(28)	0.9005
Scaled explained SS	58.58413	Prob. Chi-Square(28)	0.0006

The P value of the Obs*R-squared is 90.05%. This means that I cannot reject the null hypothesis that states that the model is not heteroskedastic. We can confidently say that the model used to explain the effect of the selected macroeconomic variables on the stock return in Ghana is a good model. In other words the model is homoskedastic and this is desirable.

4.8.3 THE TEST OF NORMALITY

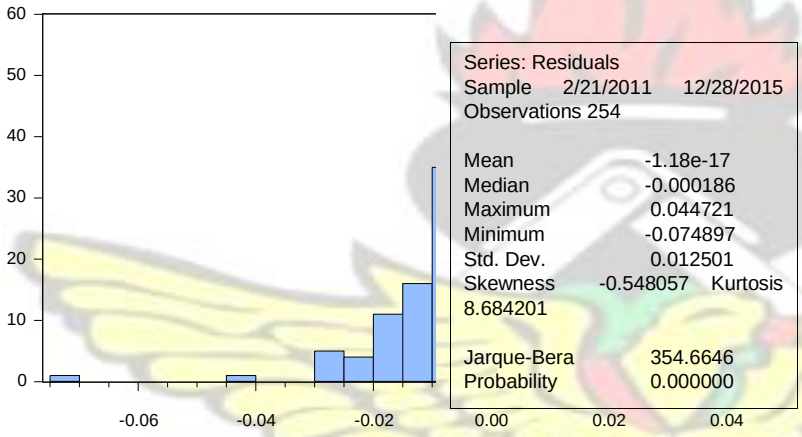


Fig 4.9 Jarque-Bera Statistics

With this test the null hypothesis states that the residual is normally distributed and this is the desirable results I are looking for. With this model we can see that our P value is 0.000% and this means we reject the null hypothesis. This means our model is not normally distributed. This places some doubts on the model but I still accept this model because the serial correlation and the heteroskedasticity tests are all favourable. Moreover the standard deviation is 0.0125 which is quite insignificant.

CHAPTER FIVE

SUMMARY, CONCLUSION & RECOMMENDATION

5.0 INTRODUCTION

This chapter covers the summary, conclusions and recommendations made by the researcher on the analysis presented in the previous chapter. It is therefore presented below as follows:

5.1 SUMMARY

The study examined the effect of Treasury Bill Rate, Exchange Rates and Inflation on the stock market returns in Ghana using weekly data from January 2011 to December 2015, Ghana Stock Exchange- Composite Index (GSE-CI) is used as a proxy for the performance of the Ghana stock market. The Three variables which were hypothesized to influence stock market returns were examined with multiple regression model (VECM) to test the relationships between the GSE-CI returns and the three macroeconomic factors. The study also explored the long run relationship between the three variables using Johansen's multivariate cointegration tests. The cointegration analysis provided evidence in support of a long-run relationship between the variables over the time horizon. The GSE composite

Index, the GHS to the USD Exchange rate the 91-day Treasury bill rate representing interest rate and the monthly inflationary rate were considered in the analysis to determine the dynamic effects of interest rate, exchange rate and inflationary changes on GSE market returns. Long run relationship between the variables was explained using the VECM and Johansen Multivariate cointegration test.

5.2 CONCLUSIONS

The following conclusions have been derived from the analysis. First, the analysis has shown that there is long run relationship between the variables and GSE returns. It was revealed that there was a negative effect between two independent variables: Treasury bill rate and the inflationary rate. In agreement to the expectations stated earlier, it was detected that Exchange rate is positively related to GSE-CI in the long run.

The implication with Treasury bill rate increase is that, stock prices will reduce when all other variables are held constant and vice versa. A 10% increase in the TBR resulted in a 2.3% decrease in GSE-CI confirming Hardouvelis (1987) and Alan and Uddin (2009) that there is a negative relationship between interest rate and stock market prices. When TBR was considered in the model without adding the EXR and INF the results was that a 10% change in the TBR caused a negative change in the GSE-CI to the tune of about 8.2%. So if TBR is considered alone against the GSE-CI the effect is higher than when it is considered with the other two macroeconomic namely inflation rate and Exchange rate. This may be explained that the increase in the Treasury bill rate makes it lucrative resulting in investors moving their investment into the Treasury bill investment.

The same affected the movement of the inflation rate and the stock prices as in Campbell (1987), Fama (1981). The movement in inflation causes purchasing power to reduce hence inability to buy more stock prices.

The positive relationship between Exchange rate and the stock returns shows active participation of foreign investors in Ghana stock market since the value traded on the exchange were more of government bonds. Once the foreign currency that gets into the country are demanded by government which is less than what she needs, the currency will depreciate. So although the currency depreciated, dollars that was largely taken by the government of Ghana

mostly passed through Ghana Stock Exchange. This therefore resulted that the depreciation of the Cedi against the Dollar, gave higher purchasing power to the foreign investors hence the ability and purchase of more stocks on the exchange. This shows that appreciation of the currency may depress the stock market when it is considered together with the TBR and INF by investors. This also implies that a depreciating exchange rate boosts the stock market when the two other macroeconomic variables under consideration are included in decision making. The exchange coefficient increased when it was used in the model without the interest rate and the inflation rate. When the TBR and INF were added to determine the estimates, the exchange rate coefficient was 8.4% positive with the GSE-CI. But when it was the only variable used against the GSE-CI in the model the coefficient of the EXR went negative around 16%. It revealed that if only EXR is considered, the impact of it on GSE-CI goes higher and opposite. There was a negative relationship between the stock return and the inflation rate. The resulted was that as inflation increase by 10%, GSE-CI also reduced by about 18%. This could be the case because inflation in general reduces the purchasing power of consumers hence the reduction in the ability to purchase more shares. When inflation became the only variable considered against the GSE-CI, the coefficient reduced from about 18% to about 9.9%. This may be interpreted that inflationary changes has a relatively less impact on the stock return in Ghana when considered alone than when it considered with exchange rate and Treasury bill rate.

Lastly the findings reveal that own shock is the main determinant of the fluctuations in the stock return on the GSE whiles the independent variables have an insignificant effect on the in the stock return GSE. Regarding the test of whether the variables cause movement in GSE-CI it was revealed that there is unidirectional causality from EXR to GSE-CI. There was no causality between inflation rate and treasury bill rate to or from the GSE-CI. It can be said

that Ghana's stock market is that of Weak efficient market hypothesis with one reason that shocks within the macroeconomic variables and that within the country has more or less no effect on the stock returns. For example, when the news of the demise of the late president Prof. Evans Atta-Mills came out in July 2012, the stock market did not respond by any means to indicate its response or shock. All these give evidence that the stock market in Ghana is not well integrated with the macroeconomic system.

5.3 RECOMMENDATIONS

The researcher recommends the following:

Ghana stock exchange report shows that 11 companies offered shares to the tune of 5109.32 million GHC and 7121.57 million GHC for sale in 2013 and 2014. This shows the confidence that businesses have in raising capital on the GSE. Government can implement policies that will ensure that the high nature Treasury Bill Rate and Exchange Rate will be reduced. Some of the measures that may help ensure that investment in stocks are more profitable for investors may include the following:

The government must put in measures to reduce the amount of domestic borrowing through the sale of treasury bill. This can be ensured through strict fiscal and monetary discipline. This will create a good economic environment for companies to perform well and this will increase the investors confidence in the companies resulting in more investment in stocks on the GSE. As investment in stocks becomes lucrative this will make investment in Treasury bill and exchange rate unattractive. Investors will invest more in the stocks on the GSE.

The government must also continue to ensure that prudent measures are put in place to ensure that inflation rates are kept low. By so doing, investors will wish to invest in both short term

and long term portfolios and will also encourage foreign investors into the Ghanaian market to boost the economy.

Potential investors pay attention to both exchange rate, Treasury bill rate and inflation rate dynamics due to the relationship that exist between these variables and the GSE-CI in the long run. Investors are advised to also consider other factors like Gross Domestic Product,

Balance of Trade and Foreign Direct Investment and its performance in their investment decisions. This is because macroeconomic variables may serve as a guide in forecasting stock market viability and to decide if it is worthwhile to invest in such portfolios. Investors, apart from the fundamental factors should consider firm specific factors in their decision to purchase the firm's stock.

5.4 SUGGESTIONS FOR FURTHER RESEARCH

The researcher initially attempted to include the gross domestic product, foreign direct investment and balance of trade in the study. However, due to difficulty in obtaining data, he limited himself to the three independent variables in his research. It would therefore be compelling to perform an empirical analysis using a wide range of data for Gross Domestic Product Foreign Direct and Balance of Trade to find out how changes in these variables affect stock return in Ghana.

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APPENDIX

Dependent variable: DLnTBR

Excluded	Chi-sq	df	Prob.
DLNGSEI	6.339922	6	0.3862
DLNEXR	0.772021	6	0.9928
DLNINF	2.080689	6	0.9121
All	9.821150	18	0.9376

Table 4.18 VAR Granger Causality from GSE -CI, EXR and INF to TBR

Dependent variable: DLNEXR

Excluded	Chi-sq	df	Prob.
DLNGSEI	5.066723	6	0.5353
DLNTBR	3.419400	6	0.7547
DLNINF	74.04214	6	0.0000
All	85.61619	18	0.0000

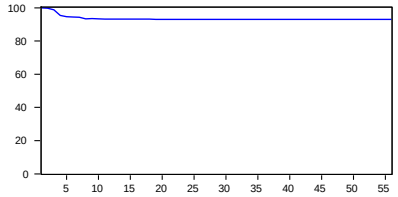
Table 4.19 VAR Granger Causality from GSE-CI, TBR and INF to EXR Dependent variable: DLNINF

Excluded	Chi-sq	df	Prob.
DLNGSEI	7.650206	6	0.2649
DLNTBR	3.591948	6	0.7317
DLNEXR	7.038832	6	0.3173
All	17.42232	18	0.4943

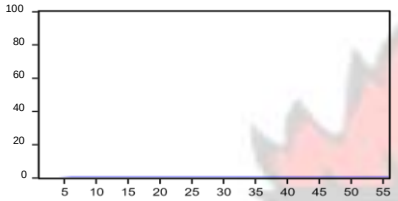
Table 4.20 VAR Granger Causality from GSE-CI, EXR and INF to TBR

Variance Decomposition

Percent DLNGSEI variance due to DLNGSEI



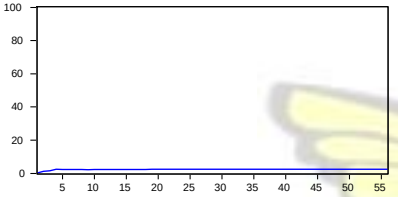
Percent DLNGSEI variance due to DLNTBR



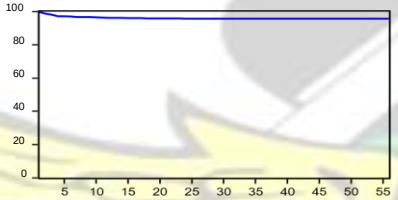
Percent DLNGSEI variance due to DLNEXR

Percent DLNGSEI variance due to DLNINF

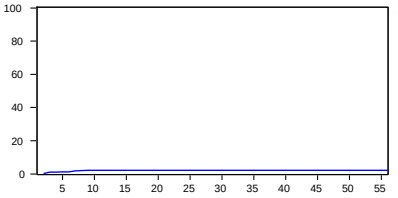
Percent DLNTBR variance due to DLNGSEI



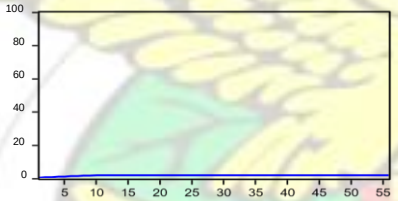
Percent DLNTBR variance due to DLNTBR



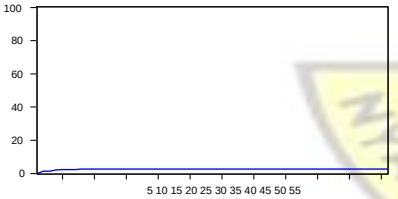
Percent DLNEXR variance due to DLNGSEI



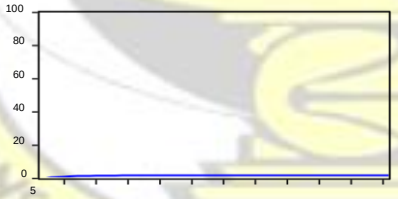
Percent DLNEXR variance due to DLNTBR

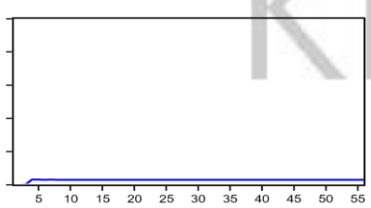


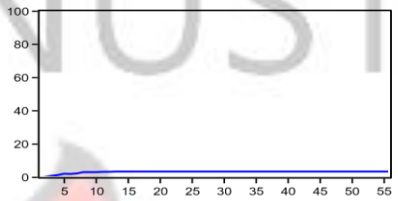
Percent DLNINF variance due to DLNGSEI



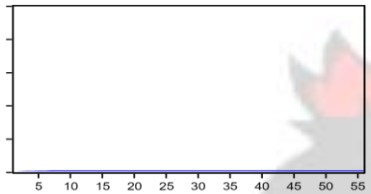
Percent DLNINF variance due to DLNTBR



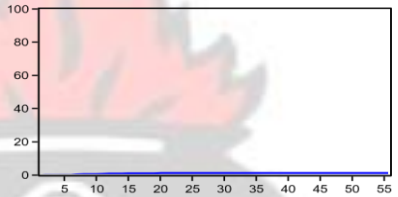




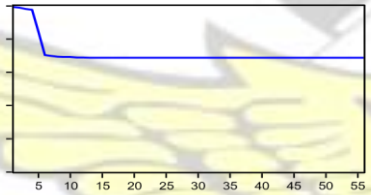
Percent DLNTBR variance due to DLNEXR



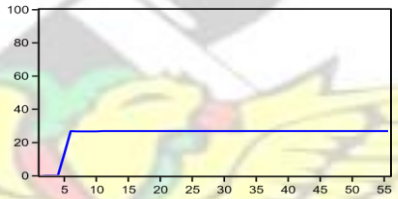
Percent DLNTBR variance due to DLNINF



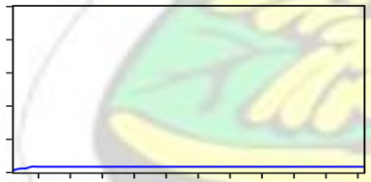
Percent DLNEXR variance due to DLNEXR



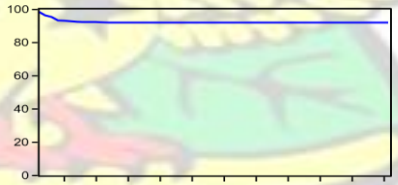
Percent DLNEXR variance due to DLNINF



Percent DLNINF variance due to DLNEXR



Percent DLNINF variance due to DLNINF



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