

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF ECONOMICS

KNUST



HOW POWERFUL ARE MACROECONOMIC VARIABLES IN THE STOCK MARKET?
THE CASE OF GHANA

JAMES PEPRAH-YEBOAH

PG 2729414

A THESIS SUBMITTED TO THE DEPARTMENT OF ECONOMICS, KWAME
NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI IN PARTIAL
FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF AN MSC ECONOMICS
DEGREE

JUNE 2016

DECLARATION

I do hereby declare that this work is the result of my own research and has not been presented by anyone for any academic award in this or any other university. All references used in the work have been fully acknowledged.

I bear sole responsibility for any shortcomings.

James Peprah-Yeboah

(PG 2729414)

Signature

Date

Certified by:

Dr. Mrs. Grace Ofori Abebrese

(Supervisor)

Signature

Date

Dr. H.M. Yussif

(Head of Department)

Signature

Date

DEDICATION

To

My family, for love, comfort, prayer and praise



ACKNOWLEDGEMENT

All praise and thanks to the Almighty God for his superabundant grace and mercies in the often stressful times of my research work. His strength and supply has brought me this far.

I acknowledge and appreciate the contributions of my knowledgeable supervisor Dr. (Mrs.) Grace Ofori Abebrese whose guidance and patience made my work possible. I am very grateful.

Finally, I am eternally grateful to my wonderful family; you make my life worth living.

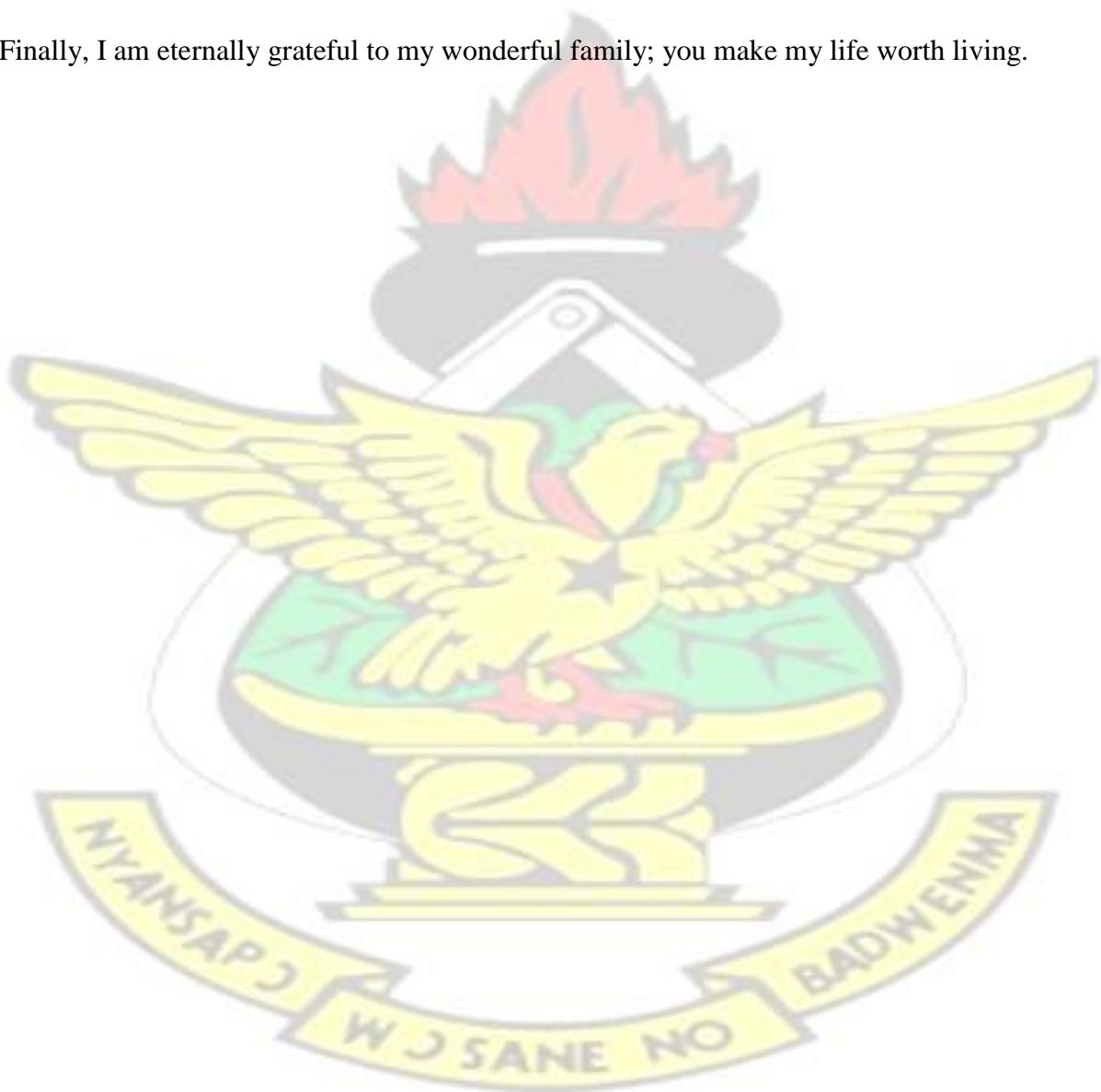


TABLE OF CONTENTS

DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
LIST OF TABLES.....	viii
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background of the study	1
1.2 Problem statement.....	2
1.3 Research questions.....	4
1.4 Objectives of the study.....	4
1.5 Hypotheses tested.....	4
1.6 Significance of the study.....	5
1.7 Limitations of the study	5
1.8 Organisation of the study.....	6
CHAPTER TWO: LITERATURE REVIEW	7
2.0 Introduction.....	7
2.1 Theoretical review	7
2.1.1. Exchange rate.....	7
2.1.2 Inflation rate.....	9
2.1.3. Interest rate	10
2.2 Theoretical models of the study	11
2.2.1 Impulse response model	11

2.2.2 The Markowitz Portfolio Theory	12
2.2.3 The Stock Market Efficiency (SME) hypothesis	12
2.3 Empirical review	13
2.4 Conceptual framework.....	19
CHAPTER THREE: METHODOLOGY	20
3.0 Introduction.....	20
3.1 Data type and sources	20
3.2 Model specification.....	21
3.3 Variable measurements	22
3.4 Analytical strategies.....	24
3.6 Analysis of Beta weights	25
3.7 Threats to validity	26
CHAPTER FOUR: PRESENTATION, ANALYSES AND DISCUSSION OF RESULTS.....	27
4.0 Introduction.....	27
4.1 Descriptive statistics of time series variables	27
4.2 Test for stationarity	29
4.3 Regression analyses	30
4.4 Discussions of results.....	32
4.4.1 Exchange rate and stock market returns	32
4.4.2 Inflation and stock market returns	33
4.4.3 Interest Rate and stock market returns.....	34

4. 5 Diagnostic tests	35
-----------------------------	----

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.....37

5.0 Introduction.....	37
-----------------------	----

5.1 Summary of research findings and contributions to knowledge.....	37
--	----

5.2 Recommendations.....	38
--------------------------	----

REFERENCES39



LIST OF TABLES

Table 4. 1 Descriptive statistics	28
Table 4. 2 Augmented Dickey-Fuller test at level	29
Table 4. 3 Augmented Dickey-Fuller test at first difference	30
Table 4. 4 Results of regression analyses	31
Table 4. 5 Regression statistics showing R, R squared and adjusted R squared	32
Table 4. 6 ANOVA	32
Table 4. 7 Pearson's correlation matrix	36
ABSTRACT	

Even though there have been studies on the effects economic variables have on the stock market, these studies have predominantly been in the developed world context. Thus, the present paper is important as it brings to the fore new evidence on the relationship between stock market behavior and selected macroeconomic indicators of the developing world setting.

Overall, the study fills a gap in knowledge by investigating the relationship between macroeconomic variables (namely exchange rate, interest rate and inflation rate) and stock market returns using the GSE All Share Index as a proxy to stock returns during the fifteen year period spanning January 2000 to December 2014. Three models formed the foundation of the study namely the Impulse response model, the Markowitz Portfolio Theory and the Stock Market Efficiency (SME) hypothesis.

Findings of the study revealed that macroeconomic variables were important predictors of stock market returns in Ghana during the period under study. One unit root increases in exchange rate, interest rate and inflation rate caused stock market returns to increase by 0.015, 0.006 and 1.677 units respectively. It was also found that exchange rate and inflation rate had a positive correlation while interest rate had a negative correlation with the GSE All Share Index.

The multiple regression results obtained from the stationary first differenced data series established a positive effect of interest rate and inflation rate on stock market returns, and a negative effect of interest rate on stock market returns. Importantly, all of the relationships examined were found to be statistically significant.

KNUST



CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Financial systems are increasingly becoming a major factor of economic growth in many countries. Stock markets have become a prominent feature of modern economies, playing critical roles in the development of these economies through the promotion of efficiency in capital formation and allocation (Adjasi & Biekpe, 2005). They channel and diversify both local and foreign capital into productive investment, thus stimulating the formation of capital and enhancing economic growth and development (El-Nader & Alarimony, 2012).

Over the years extensive research has been undertaken in this area predominantly in the context of developed economies. Economists have argued that economic indicators such as production index, interest rate, unemployment rate, dividend yield, inflation rate and foreign exchange do not affect stock market performance (Fama, 1981). Some studies have suggested the existence of such a relationship to the extent that macroeconomic factors could be used to predict variations of market performance; however, several disagreements were reported on the sign and direction of causality (El-Nader & Alarimony, 2012). Another area of inquiry largely explored has been investor exposure to the stock markets. However studies have not reached conclusive results with regards to the nexus between stock returns and economic fundamentals as demonstrated by Dempsey (2013) and Bornhot (2013). Interestingly, many studies point to the fact that excessive noise of macroeconomic variables hampers the extent to which stock returns and stock prices can act as a signal of the firms' actual intrinsic value. According to

Olweny and Kimani (2011) the underlying theory of the informational efficiency of stocks are undermined by macroeconomic volatility.

In sub-Saharan Africa, stock markets have gained prominence in the areas of risk diversification and funds mobilization as alternative sources of capital for investment, growth, and socioeconomic development (Okoli, 2012). The decline in aid from foreign sources in the early part of the 1990s exacerbated the establishment of the capital markets in some African countries, including Ghana (Fosu, Bondzie, & Okyere, 2014). Though in recent times some macroeconomic indicators such as inflation rate and interest rates have been lower and less volatile than expected, it has still been considered high both in absolute and comparative terms (Osamwonyi & Evbayiro-Osagie, 2012). Despite these developments, little attention has been given to these areas with regards to research. The Ghana Stock Exchange (GSE) for instance has continued to be one of the best performing exchanges in sub-Saharan Africa, there remains a dearth of knowledge on factors affecting the performance of the GSE (Kuwornu, 2012) thus the need for further research.

1.2 Problem statement

The Stock Exchange is the vehicle by which investors are able to efficiently liquidate or make investments in securities (Monther & Kaothar, 2010). Modern financial theory has focused on systematic risk arising from inflation, interest rate and other macro-economic variables and how they reflect on the return on individual assets. The relationship between security returns and economic indicators in advanced countries has long been the subject study of many researches (Patra and Poshakwale, 2006; Liow et al., 2006; Al-Jafari et al., 2011). Due to the risk posed by changing values of these economic factors to investors, it is imperative to determine the link between stock performance and macroeconomic factors.

Worldwide, developing and emerging capital markets of Africa such as that of Ghana is regarded as markets of the future for potential investors. From 1.8 million shares in 1991, traded equities" volume moved to its highest turnover of 125.63 million shares in 1997

(Adjasi & Biekpe, 2005). Since then, the volume fell sturdily to 104.35 million in 2004 (Twerefou & Nimo, 2005). Additional variations in macroeconomic variables include inflation; the Bank of Ghana report released in January 2008 and February 2008 showed inflation rate going up by 12.8% and 13.2% respectively and this was explained as resulting from price increase in food prices and crude oil (Owusu-Nantri & Kuwornu, 2012).

Further, a review of literature revealed that the application of different methodologies in the analysis of macroeconomic variables has been mainly the use of econometric models such as the GARCH, EGARCH, and APT. In the context of Ghana, the main methods employed in studies were found to be the Johansen"s co-integration test, the Innovation accounting techniques (Adam & Tweneboah, 2008), and the Exponential Generalised Auto-regressive Conditional Heteroskedasticity (EGARCH) model (Adjasi & Biekpe, 2005) . There has been minimal use of multiple regression analysis for such studies in developed economies and this method was virtually absent in emerging markets. This study thus employs the use of a multiple regression approaches with a comprehensive statistical tests to statistically establish the link between macroeconomic variables and stock market returns in Ghana.

Overall, the study fills a gap in knowledge by investigating the nexus between macroeconomic variables (namely interest rate, exchange rate and inflation rate) and market returns. It employs the GSE All Share Index as the proxy for stock returns for the fifteen year period spanning January 2000 to December 2014.

1.3 Research questions

In order to achieve these aims, the study sought to answer the following:

- i. Do changes in exchange rate have significant effect on the GSE All Share Index?
- ii. Do changes in interest rate have significant effect on the GSE All Share Index?
- iii. Do changes in inflation have significant effect on the GSE All Share Index?

1.4 Objectives of the study

This study examined the nexus between selected macroeconomic variables, and stock market returns of listed firms on the GSE for the period January 2000 to December 2014.

Specific Objectives:

- i. Determine whether exchange rate volatility has a significant effect on stock market returns
- ii. Ascertain whether changes in interest rates significantly affect stock market returns
- iii. Investigate whether inflationary changes have effects on stock market returns

1.5 Hypotheses tested

The following hypotheses were tested in order to answer the research questions:

$H1_0$: Changes in exchange rate have no significant effect on stock market returns in Ghana

$H2_0$: Changes in Inflationary rate have no significant effect on stock market returns in Ghana

$H3_0$: Changes in interest rate have no significant effect on stock market returns in Ghana

1.6 Significance of the study

The current study has many potential benefits to literature, practice and policy. The paper brings to the fore new evidence on how stock market behavior and selected macroeconomic indicators relate in the Ghanaian economy. Additionally, the paper highlights the need for prudent monetary and fiscal policies and strategies thus contributing to literature. It further discusses the concomitant implications of these strategies for growth and development of the capital market in Ghana. This will be beneficial to academia by providing much needed insight to lecturers, students, instructors and other future researchers on the subject matter as well as serving as a source of reference.

From an empirical standpoint, the study may facilitate investor confidence and stimulate investor decisions, because the dissertation outcomes and policy recommendations may assist policy makers in the formulation of economic targets and policies, thus influencing societal well-being.

Another useful policy implication the study may contribute to is in the area of prices and economic activity. In the event that the results of the study show that stock prices and economic activity are linked in the Ghanaian stock market; then the duration of expansion can be forecasted. This will in turn mean that it is possible to forecast the ideal time to purchase and dispose of stocks with some degree of certainty.

1.7 Limitations of the study

This study chose three macro-economic variables and explored their effect on stock returns. From inferential statistics the R-square value indicates that about 69% of total variations in stock market returns on the GSE could be accounted for by fluctuations in exchange rate,

interest rate and inflation rate. The exclusion of other macroeconomic factors which could have better predicted stock market returns may play a role. Money supply for instance is a critical variable but it's not used in the study. Further, the GSE All Share index serves as a proxy to stock performance. This index however only includes the capital gains component and not the dividend aspect of stock returns thus limiting the full impact of actual stock returns. These constraints may limit the application and generalization of the research findings.

1.8 Organisation of the study

The study is divided into five chapters that cover various sections of the study. Chapter one introduces the subject matter of the study. This is followed by an extensive review of existing literature in chapter two that cumulates in the construction of a conceptual framework that acts as a basis for the study. Chapter three, methodology, expounds the means by which the research endeavour was executed. It outlines the model specification, variable definitions and analytical strategy of the study. Chapter four presents the research findings and details the analysis carried out. Chapter five concludes the study by providing summaries of observations made and recommendations.

CHAPTER TWO LITERATURE REVIEW

2.0 Introduction

This chapter presents a review of existing literature on the effect of macro-economic variables on stock market performance. It seeks to establish the theoretical basis for comprehending more fully the findings of the study. Additionally it reviews studies undertaken on the subject matter by researchers in developed and developing countries. Ultimately, this literature review aims to inform and guide the research direction for the study.

2.1 Theoretical review

According to Kassim and Manap (2012), the importance of stock markets in the mediation process of a financial system cannot be overemphasized. El-Nader and Alrainey (2012) posited that the relation between economic indicators and stock returns was established as early as the 1980s and recent findings have also revealed strong nexus between changes in macroeconomic indicators and stock return variations.

2.1.1. Exchange rate

Olweny and Omondi (2011) define exchange rate as „the price paid for a country’s currency relative to another country’s currency“. The exchange rate is believed to influence stock prices through trade effect (Geske & Roll, 1983). The volume of exports increases with the depreciation of a domestic currency; in the case of export goods with elastic demand, cash flows for domestic companies increase and cause stock prices to increase.

Again, exchange rate sensitivity affects the rates of return of both domestic investors who aim at diversifying their portfolios in foreign markets and foreign investors in the domestic stock

market as well. Generally exchange rate changes in a floating or flexible system is of prime importance to both listed companies and investors on the GSE. Also exchange rate fluctuations have a direct effect on net foreign financial and real domestic assets of the firm which cannot be over emphasized.

Modern portfolio theory postulates that systematic risk cannot be diversified away and therefore shareholders should be paid a premium to compensate for systematic risks. In other words, if the risk from foreign exchange is insignificant or can be neutralised by diversification through hedging, then, a price can be put on this source of risk. This in turn will mean that it needs not be part of the cost of capital of firms. The sensitivity of exchange rates theoretically is a source of risk that can be taken away by diversification in an efficient financial market. Ali, Rehman, Yilmaz, Khan, and Afzal (2010) for instance posited that, an efficient foreign exchange system and stock markets arbitrage forces emphasises consistently the pricing of risks between the foreign exchange and stock markets. As a result of these forces, the transactions cost of hedging and the reduction of foreign exchange risks eventually offset.

Another model which supports the assertion of a linkage of macroeconomic indicators and stock market returns is the flow oriented model. This model refers to exchange rate movement, the trade balance of an economy and output levels of firms. It explained that share price movements have the tendency to influence aggregate demand through wealth, liquidity effects and consequently exchange rate. Precisely, a reducing stock prices results in a degeneration of wealth of the local investors and ultimately a decline of liquidity on an economy. Liquidity decline pulls down interest rates thus inducing the outflow of capital, interest rates and this cause currency depreciation.

Further, the “Stock-Oriented” model considers a country’s capital account as a link to the stock market and exchange rate. This model equates the exchange rate to the demand and supply for

assets (namely stocks and bonds) and posits that, a depreciation of a local currency against a foreign currency will in turn increase returns on the foreign currency. As a result rational investors will be coerced to transfer investments from domestic to foreign assets thus suppressing stock prices.

Finally, the goods market theory postulates that the appreciation of a local currency will have the tendency to hurt exporters and, consequently the shares of such firms would be less attractive. Resulting from the unattractiveness, the market share of an export-oriented economy is likely to fall. The presumption is that where causality exists between exchange rate and stock returns it is inversely connected.

2.1.2 Inflation rate

The theory of economics amplifies the existence of a nexus between inflation rate and stock market returns yet; the causal link has constantly posed some dilemma about whether the causality is unidirectional or bidirectional (Kuwornu & Owusu-Nantwi, 2011).

According to Asalou and Ogunmuyira (2011) inflation has both direct and indirect consequences in every sector of the economy ranging from investment, exchange rates, interest rates, unemployment, and stock markets among other variables. From the foregoing, inflation and stock markets share a very close correlation, and the rate of inflation influences the socioeconomic life of the people in a county. The effects of inflation on the stock market performance greatly influence the prices of financial instruments (assets).

Inflation can result in the reduction of the real value of money and other monetary variables over a certain period. Also, the uncertainty over projected inflation rates may have the tendency to discourage investment and savings. Therefore inflation accentuates interest rates increase,

thus putting pressure on creditors to jerk up lending rates primarily to compensate for the vicious erosion caused by inflation.

The foremost theory on the relations of inflation and stock returns was posited in 1930 by Fisher. Fisher (1930) hypothesized that stock market returns is independent of inflation expectations, but the two variables, namely inflation and stock market returns are positively related. Fisher's conclusions and hypothesis gave credence to the assertion that if inflation and stock market returns are positively related, then, equities serve as a hedge against inflation. However, Fama (1970) further pronounced the ambiguity of what Fisher postulates and explained that how inflation and stock market returns are linked can be significantly negative. The Fisher hypothesis is of prime significance because it sheds light on the expected nominal stock market returns, which equates the sum of expected inflation.

2.1.3. Interest rate

Stocks are sensitive to interest rates. Studies have reported the time varying dimensions of interest rates and the inverse effect interest rates sensitivity has on prices of equities (e.g. Titman & Warga, (1989). A rise in interest rate affects investing decisions, thus investors change the composition of their investment portfolios, generally from equities to fixed income securities (Syed and Anwar 2012). Theoretically an upsurge of interest rates will result in a decrease in rate of returns; thus, interest rate sensitivity and stock returns variations are theoretically inversely related. For example Alam, and Uddin (2009) has measured interest rates sensitivity to stock return and concluded, that, unanticipated interest rates are directly correlated to stock return.

Researchers have reported that the financial structure of some industries makes firms in that industry more susceptible to interest rates volatilities than others (Khan & Mahmood, 2013).

Interest rate sensitivity to stock returns can also be subject to causality. According to Park and Choi (2011) the effect of interest rates on the bond market is direct; however, interest rates sensitivity to stock returns had been inconsistent and not direct.

Firstly, interest rate increases eventually affect share prices negatively because they increase the interest expense of highly geared companies. This depletes cash flows that can be distributed as dividends in future. Further, interest rate changes impact how the financial assets and liabilities of nonfinancial firms are valued on the market. Interest rate volatility also impacts the opportunity cost of equity investments, making bonds more attractive. This motivates investors to replace investments in shares with bonds, thus depressing stock prices. Finally changes in interest rates have a short to medium term effect how much real activity takes place in the economy. This alters investor expectations of future cash flows, affecting equity prices.

2.2 Theoretical models of the study

This study has as its theoretical bases the Impulse Response Model, Markowitz portfolio theory and the Stock Market Efficiency hypothesis. They were chosen because they facilitate the comprehension of the nature and interrelationships between chosen macroeconomic variables and the stock market.

2.2.1 Impulse response model

The study adopts the impulse response model as outlined by Kassim and Manap (2012). The study looked at the impact of interest rate volatility on domestic and foreign banks. Their work also employed the multivariate EGARCH model to account for the intra-industry transmission of stock returns and stock volatilities.

2.2.2 The Markowitz Portfolio Theory

This theory explains the intuition behind the maximization of expected returns and portfolio risk. According to this theory, the utility of the investor is mainly a function of the first two moments (mean and variance) of returns and further takes into consideration the diversification effects of investor preferences and expectation of the risk of all assets under consideration.

Fama and French (1996) posited that the Markowitz mean-variance assumes financial or stock returns to be normality. In a real world situation, this could not be the case.

In reality, returns may not depict a normal behaviour, and empirical evidence suggests that financial returns are not normally distributed. In spite of these weaknesses of the model, it is widely used in both academic and real world applications. For instance, Huang and Yang (2010) considered the measures of skewness and kurtosis and proposed a general Markowitz portfolio investment model. Another consideration is that, the Markowitz theory has been tested extensively on various developed markets, but fewer studies of the theory have been reported on the frontier markets in sub-Saharan Africa. This study establishes the nature of various relationships between economic factors and stock market returns and since variability of returns connotes risks (deviation of returns), the mean-variance returns on the stock market were tested and interpreted as was done by Mensah, Avuglah and Dedu (2013).

2.2.3 The Stock Market Efficiency (SME) hypothesis

Researchers, financial economists and policy analysts have long debated the extent to which government policies on macroeconomic variables and fiscal deficits have had implications on stock market returns. The Ricardian equivalence proposition for instance states that macroeconomic policy actions do not impact on stock market activity. This is in agreement

with the strong form under the efficient market hypothesis. The semi strong form on the other hand contends that stock prices fully reflect all publicly available information (Fama, 1991). This study is based on the efficient market hypothesis as it assists in the determination of the degree of efficiency of the Ghana stock exchange and whether the financial sectors of the economy of Ghana was linked to overall stock returns on the GSE. However the three forms of efficiency were not tested on events announcements in Ghana.

2.3 Empirical review

The work of Ang and Ghallab (1975) centred on how the devaluation of the US dollar impacted on the stocks of 15 US Multinational firms. They calculated the abnormal return (the actual return minus the CAPM predicted return) using monthly data from August, 1971 to March, 1973. According to the study, the stock market adjusts rapidly to changes in exchange rate and thus is efficient.

Levy (1987) who employed both univariate and multivariate regression analysis also found that changes in USD exchange rate has an adverse effect on firms' gross profit; however different sectors of the economy experience this in different degrees. His study discovered that comparatively, durable goods manufacturers were more influenced by movements in the external value of the USD than certain service industries. Conversely, a later study by Sonnen and Hennigar (1998) pointed to a negative relation of movement in the USD exchange rate on the indices of industrial stock prices.

This however contradicts the conclusion by Franck and Young (1972) who found no defined or uniformly patterned stock price reactions to exchange rate realignment in their study of the relationship between exchange rate and US Multinational firms' stocks.

Loudun (1993) studied the value of the trade weighted index of the Australian dollar. He concluded that industrial as well as resource stocks do not react the same way to movements in the Australian dollar.

Solnik (1987) on the other hand looked at the effect interest rate, exchange rate, and fluctuations in inflation projections on stock prices. Among other things, this study found that when exchange rates fall, it has a more profound positive impact on the US equity market as compared to changes in inflation projections.

Banny and Enlaw (2000) examined how the Malaysian Ringgit to USD exchange rate affects prices of equities on the Kuala Lumpur Stock Exchange (KLSE). They made use of both single and multi-index models to explore the relationship and concluded that an inverse relationship exists between exchange rate and KLSE prices.

In the case of interest rates, Smirlock and Yawitz (1985) discovered that interest rate movements have a two way effect on equity prices i.e. it affects the rate of capitalisation of the firm's expected future cash flows. Their study aimed to empirically analyse the interaction amongst interest rate exogeneity, the specific monetary policy regime and announcement effects. According to them, interest rates are inversely related to stock prices. In view of this, interest rate effects on capitalization rates and expectations would in turn influence equity prices.

Other authors studied multiple macroeconomic variables with varying results. Fama (1981) posits that a strong positive correlation exist between real economic variables like capital expenditures, industrial production, real GNP, money supply, lagged inflation and interest rates and common stock returns.

More recently, Nicholas (2003) explored the interaction of nominal and real interest rates with respect to the monthly total return of the indices of thirty five (5) industries, ten (10) sectors

and four Financial Times. His findings indicated that interest rate movements significantly determine equity return variability. This has far reaching effects on every industry except forestry and paper, sector. Additionally, utilities were found to be the most sensitive to nominal interest rates volatility because they are exposed to high levels of inflation. All economic sectors were found to have statistically significant differences between interest rate and inflation sensitivities.

Wing et al. (2005) analysed time series data from January, 1982 to December, 2002 on an array of macroeconomic variables of major American and Singaporean stock indices with relation to the long-run equilibrium between the two countries. From his co-integration test, it was revealed that Singaporean equity prices, interest rate and money supply have a longrun equilibrium relationship unlike in the US.

In another instance, the arbitrage pricing theory (APT) was used by Elton and Gruber (1988) to examine Japanese equity returns in respect to several macroeconomic factors like industrial production, money supply, crude oil price and interest rates. A positive relationship was established between stock prices and short-term interest rates.

The Strait Times Industrial Index's monthly investment perspective is not influenced by money supply but interest rate impacts significantly on the STII. These were the findings of Wu (2001) whose subject of study was macroeconomic variables' interaction with the Straits Times Industrial Index (STII), using the distributed lag regression and VAR analyses.

On the contrary, a study conducted by Qiao (1996) reports a two-way effect between equity prices and exchange rate on the Tokyo stock market. Findings from other research specifically point out that there exists a long run impact of the interest rate and exchange rate movements on equities but only insignificant influence in the short run.

In 2000, Hasan and Samarakoon studied how stock market returns on the Sri Lankan stock market were affected by interest rates (measured by Treasury bill rates 3, 6 and 12 months maturities) from 1990 to 1997. The All Share Price Index (ASPI) and Sensitive price index were used as measure of stock returns. The findings indicated that there is a direct relationship between short term interest rates and future returns making it possible to reliably track expected returns prospects.

The subject of Kumar's (2009) study was how stock index and exchange rate interacted. He tested the long run relationship of daily data using the unit root and co-integration tests. The study also adopted bivariate noisy Mackey Glass model as applied by Hristu-Varsakelis and Kyrtou (2008), to investigate the nonlinear granger causality between exchange rates and the stock index. A long-run relationship was not found; however, bidirectional linear and nonlinear granger causality was discovered between the stock index and exchange rates. This study validates the both micro and macroeconomic approach to explaining the nexus between exchange rates and stock prices.

According to Muhammed and Rasheed (2002) no short-run association exists between equity prices and exchange rates. They studied the short run and long-run relationship between stock prices and exchange rates for four countries (Pakistan, India, Bangladesh and Sri-Lanka) for the period January 1994 to December 2000. They employed the co-integration, VECM modelling techniques and Granger causality tests. Interestingly, for two countries (Bangladesh and Sri Lanka) a two way causality was established between the two financial variables.

Similarly, Bahmani and Payesteh (1993) are of the view that a bi-directional causality exists between prices of equities and exchange rates even though a long run relationship is not obvious through the co-integration analysis.

Bhattacharya and Mukherjee (2003), employ the techniques of unit–root tests, co-integration and the long–run Granger non–causality test to investigate the empirical relationship between equity prices and macroeconomic variables in the Indian foreign sector. They tested the causal relationships between the Bombay Stock Exchange Sensitive Index and three macroeconomic variables; exchange rate, foreign exchange reserves and value of trade balance using monthly data for the eleven year period from 1990 to 2000. The study found no link of causality between stock prices and the three variables studied.

Amaresh (2005) explored the interrelationship between the prices of stocks (as measured by market index) and interest rates (as represented by 91 day Treasury bills) for 1985 to 2003 of three Asian countries. The results showed an insignificant co-dependence among variables for Bangladesh and Pakistan but not India. It was therefore concluded that Bangladesh and Pakistan showed very similar time series data patterns.

Schwert (1989) agrees with Hamilton and Lin (1996) that in times of recession, stock markets become more volatile. Glosten et al. (1993) on the other hand explained that interest rates are an important influence on stock market volatility.

Lobo (2002) constructs a proxy for interest rate surprises from a combination of survey data and movements in the 91 day T-bill yield. This was then used to assess the impact that sudden changes in the targeted federal funds had on prices of stocks from 1988 to 2001.

According to the study, sudden decreases targeted funds positively affect stock prices significantly. Further, surprise increases in the targeted funds agitated the stock market on the day the announcement is made, but reverted to original levels on the next day. Interestingly, it was found that this volatility pattern exists only after 1994 which implies that concerns that when changes in targeted funds are immediately disclosed, it may cause heighten stock market volatility persistently may be misplaced.

Goswami and Jung (1997) discovered a positive relationship between macroeconomic indicators and the stock prices of Korea. In their study, they used VECM to test the short run and long run relationship between price of stocks and nine macroeconomic indicators namely; long run interest rate, short run interest rate, money supply, industrial production, oil price, inflation, balance of trade for current account and foreign exchange.

In Mishra's (2004) study, no Granger's causality was found to exist between the exchange rate and stock returns. Results showed that stock returns, exchange rate returns, the demand for money and interest rate have a relationship with each other though inconsistent. Forecast error variance decomposition discovered that demand for money is affected by exchange rate return. Also there is a unidirectional causality between interest rate and exchange rate changes; exchange rate affects stock return while demand for money affects interest rates.

Ocran's (2010) study used the Johansen co-integration model, the Granger causality test, generalised impulse response function and forecasting error variance decompositions. It examined the empirical inter relationship between exchange rate (Rand to USD) and the prices of equities in South Africa and the USA. With the aid of monthly data from January 1986 to November 2005 the study established there is no long-run relationship existing between the variables of interest.

Co-integration tests carried out by Adjasi and Biekpe (2005) showed exchange depreciation brings about increases in stock prices in some of the countries in the long run, but reduce stock returns in the short run. They found this while investigating the relationship between stock market performance and exchange rate movements in seven African countries

Subair and Salihu (2010) combined annual stock market capitalization, Gross Domestic Product, inflation rate, interest rate and exchange rate volatility for the period between 1981 and 2007. Using the error correction method, the study investigated the effects of exchange

rate volatility on the Nigeria stock markets. It found that the exchange rate volatility exerts a stronger negative effect.

Adjasi et al (2008) analysed how movements in various economic indicators (especially the exchange rate) affect the stock market in Ghana. The authors attempted to find the nature of volatility in both the stock market and the exchange rate from 1995 to 2005 using the Exponential Generalised Autoregressive Conditional Heteroskedasticity (EGARCH) model. The results showed that exchange rate volatility and stock market returns are inversely related. The findings also pointed to the presence of exchange rate volatility shocks on stock returns on the Ghanaian stock market. Thus the trade-off between risk and return can be predicted and used as a guide for risk management.

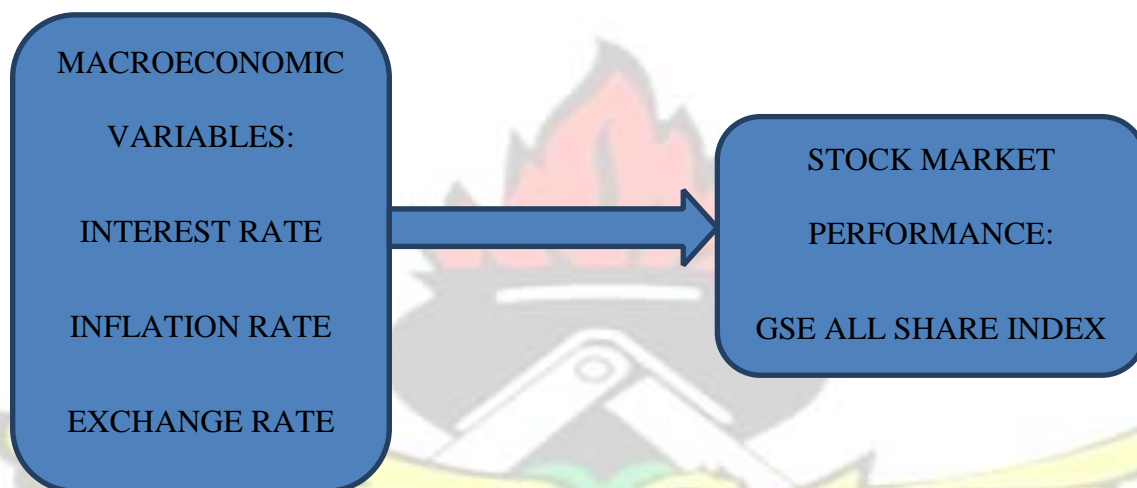
Adam and Twenenboah (2008) chose the Johansen's multivariate co-integration test and Innovation accounting techniques as their tools in examining the role of macroeconomic variables on stock price movement in Ghana. They used the Databank Stock Index as a measure of stock market performance and Treasury Bill Rate, Consumer Price Index and Exchange Rate as macroeconomic variables. Their work concludes that co-integration exists between the studied macroeconomic indicators and stock index in Ghana.

Overall, literature supports the assertion that changes in the value of financial assets are responsive to macroeconomic factors such as inflation rate, exchange rate, interest rates, GDP, money supply, unemployment rate, dividends yields, and so forth (Fosu, Bondzie, & Okyere, 2014) especially in the long term.

2.4 Conceptual framework

The conceptual framework of the study outlines the relationships under study i.e. among the macroeconomic indicators and stock market performance. It adapts the work of Olweny and

Kimani (2011) which explored the effect of macroeconomic factors on stock return fluctuations in the Nairobi stock exchange. This study examines the relationship between three macroeconomic factors namely exchange rate (dollar rate), interest rate (91 day Treasury bill rate) and inflation (Consumer price index) and the performance of the Ghana Stock exchange (GSE All share Index).



CHAPTER THREE METHODOLOGY

3.0 Introduction

This chapter brings to bare the methodological dimensions involved in this study. It seeks to justify the strategy used to obtain answers to the research questions asked in chapter one. The chapter covers the data type and sources, model specification, variable measurements and analytical strategies. It also addresses any threats to validity that may exist.

3.1 Data type and sources

The aggregate stock market returns was sourced in the form of the GSE All Share Index.

The data collection approach was consistent with the one used by Khan and Mahmood, (2013).

Data was sourced mainly from secondary sources from the Ghana Statistical Service website,

stock market fact book, the Ghana Stock Exchange website, Bank of Ghana website, and monthly bulletins published by the BoG.

The monthly BoG bulletins provided data on foreign exchange rates, interest rate and inflation rates. The stock markets fact book provided the GSE All Share index in Ghana. Complimentary data was also sourced from the websites of the World Development Indicators by the World Bank to enhance quality and check for consistency.

3.2 Model specification

The study adopted the model used by Sangmi and Mubasher (2013). It used time series data on macroeconomic variables and stock indices collected for the period January 2000 to December 2014. The model expressed Stock Market Index (SMI) as a function of selected macroeconomic variables. The model was specified as:

$$SMI_t = \beta_0 + \beta_1 WPI_t + \beta_2 ExR_t + \beta_3 IIP_t + \beta_4 M3_t + \beta_5 GP_t + \beta_6 IR_t + \varepsilon_t \dots \dots \dots (3.1)$$

Where

SMI_t = Monthly percentage change in the Stock market index;

WPI_t = Monthly percentage change in the wholesale price index;

ExR_t = Monthly change in the exchange rate;

IIP_t = Monthly percentage change in the index of production;

$M3_t$ = Monthly change in the money supply;

GP_t = Monthly change in the gold price;

IR_t =Monthly change in the interest;

ε_t = Error term; β_0 =

constant term and β =

coefficient of variables.

The above model was modified to exclude whole sale price index; index of production, money supply and gold prices, while inflation rate (consumer price index) was added. This was done in consonance with the objectives of the study.

The adapted model is as follows:

$$GSE\ CI_t = \beta_0 + \beta_1 ExR_t + \beta_2 InfR_t + \beta_3 IR_t + \varepsilon_t \dots \dots \dots (3.2)$$

Where

$GSE\ CI_t$ =Monthly percentage change in the Ghana Stock Exchange Composite Index; $InfR_t$ =Monthly change in the inflation rate measured as monthly changes in the Consumer

Price Index.

3.3 Variable measurements

I. Ghana Stock Exchange Composite Index

The official stock market index on the Ghana stock exchange is the GSE Composite Index which includes all listed equities on the GSE. The study used the monthly average change in the average price index as a measure for the stock market:

$$MR = \frac{(M_t - M_{t-1})}{(M_{t-1})} \times 100 \dots \dots \dots (3.3)$$

Where

MR= Monthly percentage change in the average price index,

M_t = Average Monthly Closing price index at time t and

M_{t-1} = Average Monthly closing price index at time t-1.

II. Change in inflation rate

Monthly inflationary figures obtained from the Ghana Statistical service were used to calculate the consumer price index as follows:

$$\text{InfR} = \frac{(CPI_t - CPI_{t-1})}{(CPI_{t-1})} \times 100 \dots \dots \dots (3.4)$$

InfR = monthly percentage change in CPI

CPI_t = Monthly CPI at time t

CPI_{t-1} = Monthly CPI at time t-1

III. Change in exchange rate

Ghana's main trade partner for both imports and exports is the United States. Thus monthly Cedi-US dollar exchange rate was deemed appropriate for this study. The monthly change in weighted average exchange rate (the buying rate of the US dollar) was used and calculated by the below-mentioned formula.

$$ER = ER_t - ER_{t-1} \dots \dots \dots (3.5)$$

ER = Monthly change in exchange rate

ER_t = Monthly weighted average exchange rate at time t

ER_{t-1} = Monthly weighted average exchange rate at time t-1

IV. Change in interest rate

The 91-day Treasury bill is appropriate as a proxy to interest rate because it serves as a cost to investment on the GSE through holding shares. The 91-day treasury rates were obtained from the monthly bulletins published by the BoG. The formula is as follows:

$$IR = IR_t - IR_{t-1} \dots \dots \dots (3.6)$$

IR= Monthly change in interest rate

IR_t =Monthly equivalent rate of the 91 day Treasury bill at time t

IR_{t-1} =Monthly equivalent rate of the 91 day Treasury bill at time t-1

3.4 Analytical strategies

Data patterns were explored with the aid of the STATA software. First of all, the basic descriptive statistics were calculated using the data collected on the various variables. This then lead to an array of diagnostic tests being performed to ascertain the extent to which the various assumptions of the ordinary least squares model were complied with.

The first test conducted was the test of multi-collinearity based on Pearson's correlation analysis. Since economic variables are not static, there is the tendency for multicollinearity to pose some problems. Thus it is important to ensure that multi-collinearity does not exist within the data.

Secondly, a test for stationarity was performed. Macroeconomic series arguably possess trending patterns i.e. they have either stochastic or deterministic trends. Thus regression analysis involving these series yield spurious results. It is therefore imperative that studies involving macroeconomic series are preceded by a test for unit root or stationarity. Also, the Durbin Watson test of serial correlation was performed. Durbin-Watson statistic lies between 0 and 4. A Durbin-Watson statistic which is substantially below 2 shows the existence of positive serial correlation. If the Durbin-Watson is less than 1.0, it indicates the case of serious positive serial correlation among regression residuals (Syed and Anwar, (2012). Finally, a test for Heteroskedasticity was performed to ensure that all the variables are homoskedastic. The ordinary least square regression model analysis was then undertaken. The F-test was done to investigate whether all the independent variables specified had zero coefficients at a significance level of 5% ($\alpha = 0.05$). The choice of the F- statistic was informed by the need to

employ a joint statistic for all the regressors. Interpretation of the data analyzed was done within the following parameters.

- (i) There is significant evidence in support of the claim when the p-value calculated is smaller than the significance level ($\alpha=0.05$) against which the test will be conducted. Thus for the study, when the p-value is smaller than 5%, it can be concluded that there is significant evidence in support of the claim that macroeconomic variables impact on stock market returns
- (ii) If the p-value is greater than the significance level ($\alpha=0.05$) then, the conclusion is that there is no significant difference between the parameters and zero.

3.6 Analysis of Beta weights

The beta value represents how strongly each predictor variable influences the independent variable. Research shows that beta weights are heavily relied on to assess variable importance (Courville and Thompson, 2001; Zientek, Carpraro and Capraro, 2008). For each given independent variable, the regression weight measures how much difference is expected in the dependent variable score between people who differ by one unit on that independent variable, when all other independent variable score are held constant (Hoyt, Leierer and Millington, 2006). The regression weights of variables that are standardized are called beta weights. The association between independent variables is represented in the beta weight for that independent variable. According to Pedhazure (1997) “a given beta weight may receive the credit for explained variance that it shares with one or more variables. As such the other weights are not given credit for this shared variance and their contribution to the regression effect is thus not fully captured in the beta weight value”.

The beta is a measure of units of standard deviations. So a beta value of 2.5 indicates that when the predictor variable changes by one standard deviation, the criterion variable will change by

2.5 standard deviations. This shows that, the higher the beta value, the greater the impact of the independent variable on the dependent variable. The signs (+ or -) of beta coefficients of multiple regression, indicate the direction of relationship between variables. If a beta coefficient is positive then the relationship of this variable and the dependent variable is positive. An example is seen in the relationship between IQ levels and the grades of students; the bigger the IQ the higher the grades.

On the other hand, a negative beta coefficient means the relationship is negative. For instance the smaller the class-size the better the class performance. A zero beta coefficient indicates that no relationship exists between the two variables.

3.7 Threats to validity

One of the key considerations of external validity is the extent to which the findings of a research can be generalized to a larger population. The population (all listed stocks on the GSE) was purposely predetermined to ensure that the dissertation outcome could be made generalizable to the population of interest. Also all 37 listed stocks on the GSE were used and therefore none of the stocks were sampled, but rather aggregated and included in the GSE All Share Index. To this effect, the generalization of findings to all elements or firms listed on the exchange will be valid on all listed stocks on the GSE.

In terms of internal validity, widely used macroeconomic variables were selected as proxies for economic indicators and those macroeconomic variables that may have the tendency to affect generalizability were eliminated. The choice of macroeconomic variables and models has also been varied. Finally the choice of monthly data instead of quarterly or annual data is to avoid spurious correlation problems which are associated with using annual or quarterly data, and without acceding to a compromise on the degrees of freedom that are required in the choice of the appropriate lag structures.

CHAPTER FOUR PRESENTATION, ANALYSES AND DISCUSSION OF RESULTS

4.0 Introduction

This chapter presents the findings that resulted from the data collection and analysis methods described in the previous chapter. It outlines the model specification used, descriptive statistics of the data set, preliminary diagnostic tests done and the results of the regression done. The results of these operations done are also discussed. The various analysis and discussions are organised according to the research objectives set for the study.

4.1 Descriptive statistics of time series variables

The three macroeconomic predictors studied are Exchange rate (ExR), Interest rate as measured by the 91 day Treasury bill rate (IntR) and Inflation rate as measured by the Consumer Price Index (InfR) and the criterion variable was Stock market returns, as measured by the GSE Composite Index (GSE CI). A total of 190 monthly time series observations were obtained for

all variables N=190. Table 4.1 presents descriptive statistics of the study variables; means, medians, sums, minimums, maximums, kurtosis, skewness and standard deviations.

Table 4.1 Descriptive statistics

	GSE CI	ExR	InfR	IntR
N	190	190	190	190
Mean	6750.27	2.2260	19.343	25.1758
Median	7335.03	2.145825	17.775	22.8
Sum	810031.95	267.125	2321.175	3021.1035
Minimum	970.0	.9054	7.34	10.130
Maximum	10891.8	3.1989	21.70	28.800
Std. Deviation	2873.0660	.6036717	3.63063	6.164735
Kurtosis	-.598	1.363	-.837	-1.605
Skewness	.477	1.300	.522	.243

The descriptive statistics from Table 4.1 showed that the values were not normally distributed about their mean and variance. Table 4.1 presents the means of all the variables (GSE CI, ExR, InfR and IntR) as 6750.27, 2.2260, 19.343, and 25.1758 respectively. The maximum values of the variables between the study periods were 10891.8, 3.1989, 27.8 and 21.70 for the GSE Composite Index, exchange rate, interest rate and inflation rate respectively. The standard deviations for each variable indicated that data were widely spread around their respective means.

Generally skewness is an indication of the symmetry of the distribution and if the mean is at the centre of the distribution or not. The level of skewness considered normal is 0. A negative value indicates a skew to the left (left tail is longer than the right tail) and a positive value indicates a skewness to the right (right tail is longer than the left one). Table 4.1 shows that all the variables are asymmetrical; all the variables are positively skewed meaning that the right tail is longer. The data shows a kurtosis of below 3 for all variables indicating that the data has a flat top in relation to the normality of the distribution (platykurtic).

4.2 Test for stationarity

Next, the Augmented Dickey –Fuller test (ADF) was undertaken on the variables at level with a lag of 1 (as informed by the Akaike and Schwarz information criteria). **Table 4. 2 Augmented Dickey-Fuller test at level**

Variables	ADF using constant	ADF using Trend	Test critical value at 5%	Mackinnon p-value
GSECI	-1.423	-1.267	-2.889	0.5710
ExR	-7.674	-5.753	-2.889	0.000
InfR	-1.353	-0.286	-2.889	0.6048
IntR	-1.582	-1.483	-2.889	0.4926

The ADF analysis showed that apart from exchange rate, all the other variables had unit roots. This is because the absolute values of the ADF test statistic for each of these variables are lesser than the absolute values of the test critical values at 5%. In addition, the p-values corresponding to each of the ADF test statistics for these variables (GSE CI, InfR and IntR) *are* greater than 5% (57%, 60% and 49%) respectively. Resulting from this, the null hypothesis of no unit roots in the data series could not be rejected. All the variables having unit roots had to be transformed into first difference to bring stationarity in these data before being used in the multivariate regression model in this study.

Table 4. 3 Augmented Dickey-Fuller test at first difference

Variables	ADF using constant	ADF using Trend	Test critical value at 5%	Mackinnon p-value
GSECI	-6.963	-6.807	-2.889	0.0000
InfR	-7.128	-6.061	-2.889	0.0000
IntR	-4.466	-4.367	-2.889	0.0002

The ADF test carried out at first difference for GSE CI, InfR and IntR showed that they are stationary at first difference meaning that they had one unit root and represented a stable series. The p-values of all variables are less than 5%, the absolute values of the ADF test statistics were also found to be greater than their corresponding test critical values at 5%. Thus the null hypothesis of variables GSE CI, InfR and IntR having unit roots at first difference could not be

accepted at 5% significance level. Following from the above results the regression was carried out with the GSE CI, InfR and IntR at first difference and the ExR at level.

4.3 Regression analyses

Following the finding that the assumptions of the ordinary least square regression model were adhered to, the regression analysis was performed. Table 4.4 presents the results.

Table 4. 4 Results of regression analyses

Model	Unstandardized		Standardized	T	Sig.	Correlations		
	B	Std.	Beta			Zero-order	Partial	Part
Constant	49.73	9.39.		19.50	0.557			
ExR	0.015	0.16	0.012	0.129	0.028	0.084	0.146	0.127
InfR	0.006	0.021	0.0350	0.279	0.0181	0.274	0.291	0.260
IntR	-1.677	0.420	-0.505	0.098	0.0027	-0.430	-0.446	-0.427

Predicted SMR= 49.73+0.015ExR+0.006InfR-1.677IntR.....table 4.4

The model equation obtained above suggests that the stock market will be able to achieve 49.73 units without the influence of any of the macroeconomic variables. The standardized weights indicated at the Beta coefficients in Table 4.4 lead to the following equation:

$$Z_{predictedSMR}=0.012_{ExR}+0.0350_{InfR}-0.505_{IntR}$$

The p-values of the t-statistics indicate both the B and Beta weights of the macroeconomic variables (exchange rate, inflation rate and interest rate) are all statistically insignificant (pvalue more than 0.05).

Therefore although all the variables have a positive effect on stock market returns, their effect is statistically not significant. The Partial column under correlations shown in Table 4.4, lists the partial correlations for each predictor according to how it was evaluated for weighting in the model. That is, the correlation between the independent and the dependent variable when the other predictors are treated as covariates.

Furthermore, the part column under correlations also shown in Table 4.4, lists each predictor variable's semi partial correlations after the model is finalized. The square of the part values is equal to the percentage of variance uniquely explained by each predictor. This implies that for the period January 2000 to December 2014, exchange rate, inflation rate and interest rate accounted for 1.6129% ($0.127 \times 0.127 \times 100\%$), 6.76% ($0.26 \times 0.26 \times 100\%$) and 18.23% ($-0.427 \times -0.427 \times 100\%$) of variations in stock market returns respectively in Ghana.

Table 4. 5 Regression statistics showing R, R squared and adjusted R squared

Model	R	R Squared	Adjusted	Std Error
1	0.698 ^a	0.636	0.582	13.17831

a: Predictors: (Constant), ExR, InfR, IntR

From Table 4.5 the R value of 0.698 indicates moderate correlation between aggregate share price index of the GSE and the macroeconomic variables. The R squared shows that about 63% of fluctuations in aggregate share index on the GSE are explained by the macroeconomic variables. This result is attributed and explained by the macroeconomic variables while the 37% could be explained by other factors not related to the chosen macroeconomic variables. The adjusted R square showed that the relationship is an actual one and not merely due to spurious regression problem.

The ANOVA or F test, shown in Table 4.6 indicates an F value of 0.141 with significance of 0.035 ($p < 0.05$) and provided statistical evidence that the macroeconomic variables of exchange rate, interest rate and inflation rate simultaneously and jointly affect the GSE

Composite Index.

Table 4. 6 ANOVA

Model		Sum of Squares	Df	Mean Squares	F	Sig
1	Regression	191477.507	3	63825.836	0.141	0.035 ^a
	Residual	5.214E7	115	453412.786		
	Total	5.233E7	118			

a: Predictors (Constant), ExR, InfR, Int

4.4 Discussions of results

4.4.1 Exchange rate and stock market returns

The openness of Ghana's economy is recognized as the reason for the volatility of its market (Adjasi, Harvey & Adyapong, 2008). According to them, increases in lagged values of the macroeconomic variables created disequilibrium in aggregate stock price movements, and this caused current or potentially future values of stock prices to reduce. The Ghana stock market responded to this disequilibrium created by the macroeconomic variables by increasing in terms of aggregate stock prices in order to correct this disequilibrium. Also, exchange rate changes have real economic costs for profitability, price stability and even a country's stability (Rehman, 2013). In agreement with the above studies, the current study found a significant nexus between stock performance and the exchange rate of Ghana's cedi against the dollar. 0.015 units of change in stock performance were attributable to a unit change in exchange rate changes. This accounted for 1.6% of stock performance movement. Most importantly, the influence of exchange rate changes was statistically significant. Thus, depreciation of the Ghanaian currency affects stock market returns. This assertion is consistent with that of Adjasi, Harvey and Adyapong (2008) who studied the relationship between the exchange market and

equity markets using EGARCH to determine whether movements in the foreign exchange market have an effect on the Ghana stock market. They found a negative relationship between exchange rate movements and stock market returns.

As per the findings of this study, it is worth noting that investor speculations, significantly explains the effect of foreign exchange changes on asset prices in Ghana. Rehman (2013) observed that not all investors are rational and this has the tendency to limit arbitrage possibilities. This implies that shifts resulting from investor sentiments can cause exchange rate volatility with implications on asset prices or stocks.

4.4.2 Inflation and stock market returns

Secondly, it was found that inflation rate significantly affects stock market returns in Ghana. A beta value of 0.006, part correlation of 6.7% and p-value of 0.18 were obtained. These results mean that aggregate stock price movements are generally sensitive to general changes in the prices of goods, as measured by the CPI. This suggests that Ghanaian investors might not like inflation rate (general prices of goods in the consumer basket) to increase, and thus their investments in corporate stocks are influenced by the general rate of inflation in the macro economy; investors are not only interested in their present consumption but also investments for their future.

Rationally investors in Ghana will always expect their returns to be insulated from inflation rate. Thus in an ideal situation excess returns on common equity should move at tandem with the inflation rate. This hypothesis has been extensively tested by financial economists in the context of the Fisher hypothesis. Fisher (1930) originally explained that the market interest rate includes the expected real interest rate and expected inflation rate. This assertion is far from conclusive particularly considering the Ghanaian situation. In Ghana, Anokye and Siaw (2010) carried out an investigation into how stocks can be hedged against inflation rate on the Ghana stock market in the long run. They explained that in Ghana after the economic restructuring in

the 1980s and the FINSAP, the country has always adhered to strict monetary and fiscal policies which have been reported to be very high and volatile in comparison to the economically developed countries like the USA.

Inflationary trends in Ghana has shown consistently an increasing trend while the market capitalization of the GSE All Share Index has in response rose by 116% in 1993 and increased by 124.3% in its index level in 1994 (Anokye & Siaw, 2010). The GSE quarterly bulletin reported that in 1995 the index grew only by 6.3% and this very bad performance was partly blamed on high inflation rate and interest rate.

In this study, it is reported that inflation rate significantly affects stock market returns in Ghana. This finding will help address the question of whether the Ghana stock market is a good buffer against inflation rate. The current study's findings reiterate the findings of Anokye and Siaw (2010).

4.4.3 Interest Rate and stock market returns

Finally, interest rate volatilities exert a significant negative (beta of -1.677, p-value 0.0027) impact on the equity market's returns in Ghana. These findings suggested that increases in the government of Ghana 91 Day Treasury Bill rates causes aggregate stock prices to decrease appreciably.

Investors in Ghana view the 91 Day Treasury-bill rate as the alternative foregone of holding shares. Thus it is an ideal proxy for interest rates in Ghana. It is therefore reasonable to expect that increases in the 91 Day Treasury bill rates will result in the realignment of the investment portfolio of Ghanaian investors against stocks listed on the GSE. This relationship is the basis for the hypothesis tested in this study.

Issahaku (2013) investigated the causality between macroeconomic variables and market returns. He discovered that in the short run, a significant relationship exists between stock

market performance and interest rate. Further a causal relationship running from stock returns and interest rate exists.

In tandem with his findings, interest rate changes were found to exert a significant inverse effect on stock returns in Ghana during the period under consideration. This suggests that an increase in government of Ghana 91-Day Treasury (T)-Bill rates caused aggregate stock prices to move down. Therefore it can be concluded that though Ghanaian investors may have had low risk appetite, due to their desire to increase their returns on investment, monthly movements in government of Ghana T-bill rates, (which were generally less risky than corporate stocks, but with relatively lower returns than corporate stocks) affects their investment decisions.

4. 5 Diagnostic tests

Firstly, the Pearson's correlation matrix was employed as a means of testing for multicollinearity. Table 4.7 presents the results.

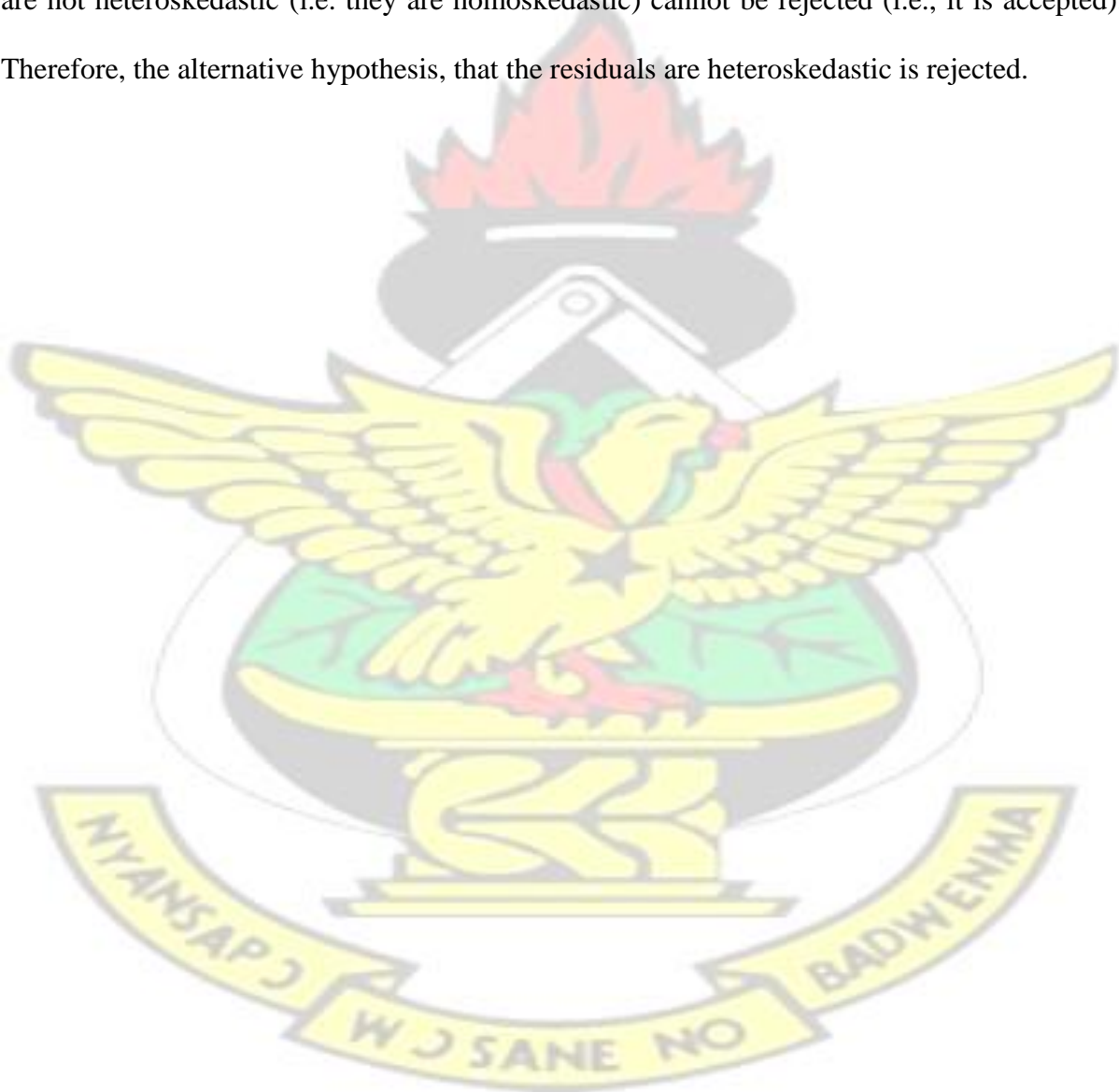
Table 4.7 Pearson's correlation matrix

		GSE CI	ExR	InfR	IntR
GSE CI	Pearson's correlation	1			
	P value				
ExR	Pearson's correlation	0.13	1		
	P value	0.039			
InfR	Pearson's correlation	0.56	0.0200	1	
	P value	0.029	0.826		
IntR	Pearson's correlation	-0.034	-0.004	0.240	1
	P value	0.0071	0.965	0.009	

The results clearly shows a low level of correlation between the independent variables; exchange rate and inflation rate ($r=0.02$), exchange rate and interest rate ($r= -0.004$) interest rate and inflation rate ($r = 0.24$). Thus there is no multicollinearity within the independent variables.

A test for serial correlation was also carried out to ascertain whether the assumption of no serial correlation was met. The Durbin –Watson statistic obtained by running the analysis using the data series at first difference has a value of 1.982 (approximately 2). This strongly suggests the absence of serial correlation in regression residuals.

Finally, the Breusch-Pagan-Godfrey Heteroskedasticity test was done. The chi-squared probability value was 0.2919 which is greater than 0.05. Thus the null hypothesis that residuals are not heteroskedastic (i.e. they are homoskedastic) cannot be rejected (i.e., it is accepted). Therefore, the alternative hypothesis, that the residuals are heteroskedastic is rejected.



CHAPTER FIVE SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter gives a snapshot of the discussions and analysis that played out in the previous chapter. Conclusions are drawn from the discussion and recommendations are made. Areas covered include summary of findings, conclusions and recommendations.

5.1 Summary of research findings and contributions to knowledge

Consistent with the prior literature, macroeconomic variables have an influence on stock returns. The various statistical tests discussed in Chapter 4 revealed that macroeconomic variables were important predictors of stock market returns in Ghana during the period under study. Findings indicated that one unit increases in exchange rate interest rate and inflation rate caused stock market returns to increase by 0.015, 1.677 and 0.006 units respectively. It was also found that interest rate had a negative relationship while the other two variables had a positive correlation with the GSE All Share Index.

The multiple regression results obtained from the stationary first differenced data series established a positive effect of exchange rate and inflation rate on stock market returns and a negative effect of interest rate on stock market returns. Importantly, all of the relationships examined were found to be statistically significant. The regression analysis revealed a p-value of less than 0.05 in all instances (exchange rate: 0.028 inflation rate: 0.018 and interest rate: 0.002)

5.2 Recommendations

The econometric models employed in this study assumed that external shocks had no significant effect on stock price movements. If the regression model used had made room for external shocks such as the 2008-2009 global financial cycle and the 2012 political tension in the country due to the election controversy by introducing appropriate dummy variables, a better picture would have emerged.

In this study, the obtained R-square meant that about 69% of total variations in stock market returns on the GSE could be accounted for by changes in exchange rate, interest rate and inflation rate. The results signalled the probable exclusion of some other macroeconomic variables which could have better predicted stock price movements on the GSE than the three chosen in this study.

Other macroeconomic variables such as crude oil prices, unemployment rate, fiscal deficit, external debt, industrial production and other external shocks have been found to strongly impact stock market returns. It is therefore recommended that future research in Ghana needs to expand the macroeconomic variables to include a time series data of Ghana's GDP for a specified period and the effect of events information such as the 2012 political tension in Ghana as additional predictive variables on the GSE All Share Index. To avoid erroneous conclusions it is further recommend that research is carried out on the assertion of information asymmetry and degree of the efficiency of the Ghana stock market.

Since the Ghana Stock Exchange responds to the movement in the macro economic variables, investment decisions should be linked to macroeconomic indicators. However, qualitative factors such as management performance should also be considered. Further, the statistically significant relationship suggests that policy makers must concentrate on improving the general macroeconomic situation in a bid to encourage growth of the stock market.

REFERENCES

- Adjasi, C., & Biekpe, B. (2005). Stock market returns and exchange rate dynamics in selected African countries: A bivariate analysis. *The African Finance Journal*, 2(6), 17-28
Retrieved from <http://dx.doi.org/10.1353/jda.0.0032>.
- Aggarwal, R. (1981). International differences in capital structure norms: An empirical study of large European companies. . *Management International Review*, 75-88.
- Alam, M., & Uddin, M. (2009). Relationship between interest rates and stock prices: Empirical evidence from developed and developing countries. *International Journal of Business and Management*, 4(3), 43-50. Retrieved from <http://dx.doi.org/10.5539/ijbm.v4n3p43>.
- Ali, I., Rehman, K., Yilmaz, A., Khan, M., & Afazal, h. (2010). Causal relationship between macroeconomic indicators and stock exchange prices in Pakistan. *African Journal of Business Management*, 4(3), 312-319.
- Ang, J., & Ghallab, A. (1975). The impact of US devaluations on the stock prices of multinational corporations. *Journal of Business Research*, 4(1), 25-34.
- Fama, E. (1970). Stock returns, expected returns and real activity. *Journal of Finance* 45, 1089-1108. Retrieved from <http://dx.doi.org/10.1111/j.1540-6261.1990.tb02428.x>.
- Fisher, I. (1930). *The Theory of Interest*. New York. Retrieved from <http://dx.doi.org/10.2307/2342072>: Macmillan .
- Fosu, O., Bondzie, E. A., & Okyere, A. (2014). Does foreign direct investment really affect Ghana's economic growth? . *International Journal of Academic Research and Managment Science*, 3(1), ISSN: 2226-3624. Retrieved from <http://dx.doi.org/10.6007/ijarems/v3-i1/602>.

- Geske, R., & Roll, R. (1983). The fiscal and monetary linkage between stock returns and inflation. *Journal of finance*(38), 7-33.
- Isshaku, H., Ustarz, Y., & Domanban, B. P. (2013). Macroeconomic variables and stock market returns in Ghana. Any causal link? *Asian Economic and Financial Review*. 3(8), 1044-1062. Retrieved from <http://dx.doi.org/10.1787/888933143526>.
- Kassim, S., & Manap, T. (2012). Responses to interest rate changes: A comparison between domestic and foreign commercial banks in Malaysia. *Malaysian Journal of Economics Studies* 49(1), 21-35.
- Kuwornu, J. K. (2012). effect of macroeconomics variables on the Ghanaian stock market returns: A co-integration analysis. *Agris on-line papers in economics and informatics*, 4(2), 1-12. Retrieved from <http://dx.doi.org/10.1787/888933143526>.
- Kuwornu, J., & Owusu-Nantwi, V. (2011). Macroeconomic variables and stock market returns. Full information livelihood estimation. *Research Journal in Finance and Accounting*. 2(4), 49-63. Retrieved from <http://dx.doi.org/10.1787/888933143526>.
- Okoli, M. (2012). Return volatility interactions in the Nigerian stock market. *Asian Economic and Financial Review* 2(2)., 389-399.
- Olweny, T., & Kimani, D. (2011). Stock Market performance and Economic Growth: Empirical Evidence from Kenya using Causality Test Approach. *Advances in Management & Applied Economic* 1(3), 153-196 Retrieved from the Business Source Complete database.
- Olweny, T., & Omondi, K. (2011). The effect of macro-economic factors on stock return volatility in the Nairobi stock exchange, Kenya. *Economics and Finance Review* 1(10), 34-48.

Osamwonyi, I. O., & Evbayiro-Osagie, E. I. (2012). The relationship between macroeconomic variables and stock market index in Nigeria. *Journal of Economics*, 3(1), 55-63.

Owusu-Nantri, V., & Kuwornu, J. (2012). Analyzing the effect of macroeconomic variables on stock market returns: Evidence from Ghana. *Journal of Economic and International Finance*, 3(11), 605-615.

Park, J., & Choi, P. (2011). Interest rate sensitivity of US property/liability insurer stock returns. *Managerial Finance*, 7(3), 134-150. Retrieved from <http://dx.doi.org/10.1108/03074351111103677>.

Patra, T., & Poshakwale, S. (2006). Economic variables and stock market returns: evidence from the Athens stock exchange. *Journal of Applied Financial Economics*, 16(13), 993-1005. Retrieved from <http://dx.doi.org/10.1080/09603100500426523>.

Sangmi, M., & Mubasher, H. M. (2013). Macroeconomic variables on stock market interactions: The Indian experience. *Advances In Management*, 6(8), Retrieved from <http://dx.doi.org/10.9790/487x-01131528>.

Twerefou, D., & Nimo, M. (2005). The impact of Microeconomic Risk on Asset Prices in Ghana. *African Development Bank. The Institute of Statistics Social and Economic Research (ISSER)*., Retrieved from <http://dx.doi.org/10.1111/j.10176772.2005.00111.x>.