AN EXAMINATION OF THE EFFECT OF MACROECONOMIC VARIABLES ON GHANA STOCK MARKET RETURNS IN GHANA

By

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

MASTER OF SCIENCE

(ECONOMICS)

MAY, 2016

DECLARATION

I hereby declare that this thesis is my own work towards the award of MSc Economics. To the best of my knowledge and with the exception of those acknowledged in the text, it does not contain any material previously published or accepted for the award of another degree in this University.

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DEDICATION

This work is dedicated first and foremost to the Almighty God making this programme a successful one. Secondly to my father, William Tieku and Mother;

Janet Sarpong for their sacrifices and support during the period of study, my husband ,Kojo Yeboah-Gyan who sacrificed his financial resources to help finance this programme of study and the entire Tieku family. May the good Lord richly bless them all.

ABSTRACT

This study sought to investigate the effects of macroeconomic variables in Ghana Stock Exchange using time series analysis from the period of 2000-2013.

Five micro economic variables were used which include Ghana Stock Exchange, exchange rate, inflation rate, T-bill rate (proxy for interest rate) and Broad money supply (M2). Data on the Stock Exchange was proxy as the All –share index where all these variables were obtained from the Ghana Stock Exchange and the Bank of Ghana as a secondary source.

A test for unit root using Augmented Dickey Fuller was performed. This showed that the variables exhibited the presence of unit root at 95% confidence interval.

Further Johansen and Julius trace and maximum Eigen value tested for co-integration came out to test for the existence of Long run relation among the variables where lastly this was followed by the estimation of vector error correction module of the short and long run impact relationship among the selected micro economic variables and stock pricing.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Prior to the late 1980s, developed governments and international donors in developing countries held the notion that entrepreneurial functions could be better managed and controlled by the state ownership by means of production, taxation, licensing and regulation. Due to the poor performance of the public sector in misallocations of resources, market inefficiencies and negative economic growth led to the re-evolution of the state led development strategy. This led to the liberalization and privatization becoming dominant themes in development strategies especially in Africa. There has been a sudden turn-around from the previously perceived attitude towards the private sector to a more positive attitude towards the private sector which is now regarded as the engine of growth. However, the impact of stock market in an economy cannot be understated. This is due to the fact that it is often argued that the strength of an economy is influenced by the strength and size of the country's capital market which is the ability to raise capital quickly and efficiently. Stock markets all over the world serve as an avenue through which funds for both private and public sectors can be raised. Pearce (1983) described the movement of stock prices as indicative of future economic direction which also impacted on the current movement of the economy.

Fama (1991) also emphasized the point that stock markets act as leading indicators of the business cycle, meaning they were a good predictor of economic growth path. The provision of funds to finance domestic capital formation is increasingly being recognized as a key factor bearing upon the prospects for long-term economic growth in developing countries. According to Thorbecke (1997), stock prices are the present

value of discounted future cash flows. This suggest that movement of macroeconomic variables in an economy will be able to affect the prices of stocks since they have an impact on the future cash flows of stock or the discounting factor upon which stocks are brought to their present valuation.

The Ghana stock market has the source of raising capital for both existing and new firms since it was established in 1989. It started operation as a private limited liability company in 1990 before it was later converted to public limited by guarantee. The stock market has performed greatly over the years winning many awards in its short periods of existence. Compared to many developed stock markets, the Ghana stock market is relatively young but increasing being viewed as a market to watch. (Ghana Stock Exchange, 2015).

Macroeconomic variables such as inflation and interest rate have always been a concern to many private and public investors and participants of stock trading in Ghana. This has been a rapid increase in interest rates and inflation rate in Ghana over the past few years. Coupled with the movements in exchange rates in Ghana and money supply, it will be expedient and worthwhile that finding how these have affected the pricing of stocks and the general performance of stock market in Ghana is of major importance.

1.2 The Problem Statement

There has been constant research in many major economies that points to the fact that since stock market prices are determined by future expectations about the movement of the underlining firms of the stock market, they are influenced greatly by movements in macroeconomic variables. These claims are supported by Thorbecke

(1997), Mukherjee and Naka (1995), Junkin, (2012), Lintner (1965), and Mossin

(1966), Also is the fact that several theories have tested the relationship between stock markets movements and macroeconomic variables. These theories include the Arbitrage Pricing Theory and the Capital Asset Pricing Model.

The importance of stock market activities in providing and efficiently allocating capital for investment and economic growth cannot be ignored. They provide the avenue for capital accumulation and liquidity and therefore are very important to the financial setup of an economy. This is because emerging capital market of Africa including that of Ghana are also attracting to the world attention as market of the future are with a lot of potential for investors. Yet there is no comprehensive studies linking these capital markets returns with macroeconomic indicators such as interest rate, inflation and money supply among others which to large extent are expected to influence capital market activities.

However in filling this yawning gap i.e. to establish the linkage between the changing level of macroeconomic fundamental and Ghana stock Exchange All share Index as far as the Ghana stock market is concerned. In Ghana and elsewhere in Africa, where macroeconomic management has been problematic, such a research will be of great interest to current as well as potential investors wishing to invest on the capital market of Ghana in particular and Africa in general. Hence the need for this research at this time is of paramount interest to all stakeholder of Ghana's capital market.

1.3 Objectives of Study

Generally, the study's main objective is to examine the effect of macro-economic variables on the Ghana Stock Exchange All Share Index.

However the specific objectives that are based on the main objective can be identifies as follows

I. To undertake trend analysis of stock market returns and

macroeconomic variables.

II. To examine the long-run association between the individual macroeconomic indicators and the stock

1.4 Hypothesis of the Study

This study attempts to prove that:

H_0: There is no significant effect of macroeconomic variables on stock market returns

H_1: There is significant effect of macroeconomic variables on stock market returns

To address the second objective, the following hypothesis will be tested;

H_0: There is no significant effect of trend analysis of stock market return and macroeconomic variables

The hypothesis for the third objective is stated as below;

H_0: There is no long run association between macroeconomic variables on the stock market return.

1.5 Justification of the study

The importance of this research is to validate the role of stock market as a leading indicator for macroeconomic decisions in an economy. The study examines whether stock market returns are influenced by macroeconomic variables and to what extent movements in macroeconomic variables have influence on stocks. This study intends to employ empirical analysis to know the hypothesized effect of the macroeconomic variables on either Stock pricing or return on asset to predict the volatility or the duration of recession and expansion in the economy.

The research outcome will also serve as a reference for future academic work by students also willing to research in the areas of macroeconomic impact on pricing of assets and other related areas.

This research will also guide policy makers and government officials in the careful management of the economy as a whole since their actions will most certainly have an impact on the wealth and investments of the citizenry.

1.6 Scope of the study

The study under consideration will aim at analyzing the effect of macroeconomic variables on GSE All index share. However obtaining and collating data for this research is one of the mitigating factors for this research. The macroeconomic variables to be considered include Money supply, Exchange rate, Inflation and Interest rate from 2000-2013. The period 2000-2013 has been chosen because it covers the period where the GSE experienced normal and abnormal growth in returns.

It is hoped that this gives a true, fair and objective research result.

1.7 Organization of the Study

The study will be divided into five main chapters. Chapter one is designated for the introduction and therefore will include the background to the study, problem statement and justification of the study. Chapter two will contain the literary content on which this whole study is based and therefore will look into the both the theoretical and empirical framework of the study. Chapter there will deal with the methodology and it will give directions as to how the objectives of the study can be achieved using econometric analysis. Chapter four will deal with analysis and discussion of results and this will tackle the set objective of the study. Finally, chapter five will be for the summary of findings, conclusion and recommendation. This chapter will conclude the study by summarizing the study into few paragraphs and will also set the tone for areas for further study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter deals with relevant literature which underpins this study. It starts from the theoretical framework on which the relationship between stocks and macroeconomic variables can be formed and then there is empirical literature which indicates previous study into this area. This is due to the fact that this chapter serves as the backbone on which this study rest and therefore, the review of both theoretical and empirical literature is essential in investigating the relationship between macroeconomic forces and stock returns.

2.2 The Theoretical Frame Work

The relationship between macroeconomic variables and stock returns has been extensively studied and debated. This relationship is well illustrated by Miller and Modigliani (1961) Dividend Discount Model (DDM) than any other theoretical stock valuation model. According to the Dividend Discount Model, the current price of a stock is equal to the present value of all future cash flows to the equity. This can be written as;

$$P = \frac{\pi_t}{(K_{s-g})n}$$

Where P is the price of the stock price,

π_t, is the expected cash flows or the profit earned in period

K is the required rate of return and g is the growth rate. Thus determinants of the Share prices are the required rate of return, and the expected cash flows (Elton and Gruber, 1991).

2.3 Pricing of assets and Emerging Capital Stock

Assets pricing brings us the understanding of why certain capital assets have higher expected returns than others and why the expected returns are different at different points in time. However there are two main theories of assets pricing exist: The capital assets pricing model (CAPM) by Markowitz, Sharpe and Miller (Burton, 1998) and the arbitrage pricing theory (APT) by Ross (1976) are the most commonly discussed and tested models.

The International Capital Asset Pricing (ICAMP), as developed by solnik (1971) assumes a single factor return generating process and proposes that if markets are globally integrated, the asset return will be determined by their exposure to a single period world factor.

Typically, this risk source is assumed to be the return on a value-weighed world portfolio, such as the MSCL world index.

2.4 Capital Asset Pricing Modem (CAPM)

The model was developed independently by Sharpe, (1964), Litner, (1965) and Mosin, (1966). The CAPM is based on very simplified assumptions. Basically, the theory ask the following question: what are the equilibrium rates of returns if all investor apply the mean-variance criterion to an identical mean-variance-effect set .However several studies have been carried out on the risk and return characteristics in different markets (frontier, emerging and developed).

Risk, return and volume examined by Battilossi & Houpt (2006) in an emerging stock market, using Bilbao Stock Exchange, Spain as the case study reveals strong evidence in favour of auto correlation and GARCH effects, where no evidence of risk-return relationship. Both equally found a weak evidence of a contemporaneous impact of trading volumes on returns. Their findings are generally in line with the results obtained by similar studies on emerging markets (see Blume, Easley, & O'Hara, 1994; Suominen 2001; Hiemstra & Jones, 1994; Chordia & Swaminathan, 2000; Gallo & Pacini 2000; and Omran & McKenzie, 2000.

2.4.1 The Theory

The capital assets pricing model (CAPM) was proposed as a model of risk and return by Sharpe (1964), Lintner (1965) and Mossin (1966), amongst others. It has become the most important model of the relationship between risk and return in asset pricing. This was celebrated by the works of Black et al. (1972) and Fama and Macbeth (1973).CAPM has its basis in the construction of an efficient market portfolio that maximizes return, given a level of risk. The expected return of an individual security is a function of its risk covariance with the market. The model stipulates that the expected return on a stock is Determined by the risk free interest rate (r_f) and a risk premium (r_m) which is a function of the stock's responsiveness to the overall movement in the market that is its beta coefficient. The CAPM can be written as;

$$K = \quad r_f + (r_m - r_f)\beta.$$

Where k is the expected return on a stock;

Rf is the risk free rate of return;

***Rm* is the expected market return (return on the market portfolio);** β is the beta coefficient which is a function of the stock responsiveness to the overall

movements in the market. It measures the volatility especially systematic risk of an investment portfolio in comparison of the market performance. Early empirical tests of the model generally supported its main predictions as beta being the only explanatory factor in explaining the cross sectional variation across stock portfolios. Arguments by Roll (1977) marks that the market portfolio should in theory include all types of assets held by anyone as an investment including works of arts, real estate, human capital etc. confirms in practice, such a market portfolio is unseen and people usually substitute stock index as a proxy for the true market portfolio. Due to the unobservality of the true market portfolio the CAPM might not be empirically

testable. This is referred to as Roll's Critique.

2.4.2 Assumption Underlying CAPM

- This model establishes the covariance between market returns and returns on a single security.
- The covariance measure can be used to establish the risky rate of return, *K*, for a particular security, given expected market returns and the expected risk free rate.
- The capital asset pricing model (CAPM) establishes a relationship between the risk associated with the purchase of a stock and its rate of return.
- CAPM asserts that the required return on a company's stock is equal to the risk-free rate of return plus a risk premium

- If B> 1, then the rate of return is more volatile than the market average. In this case, an increase in the risk free rate results in a decline in the required rate of return.

- If (0<B<1), then an increase in the risk free rate will result in an increase in the required rate of return. In this case, the rate of return on a company's stock price is less volatile than the market average.

- The value of B is derived from a regression model

2.3 Arbitrage Pricing

Arbitrage pricing theory is a general theory of asset pricing that has become influential in the pricing of Assets. This theory was developed primarily by the economist Stephen Ross in 1976 as an alternative to the CAPM. It is a multi-factor model in which every investor believes that the stochastic properties of returns of capital assets are consistent with factors structure.

Ross (1976) argues that if equilibrium prices offer no arbitrage opportunities over static portfolio of assets, then the expected returns on the assets are approximately linearly related to the factor loadings or beta. In other words, the expected returns of a financial asset can be modeled as a linear function of various macroeconomic variables or theoretical market indices, where the sensitivity to change in each factor is represented by a factor– specific beta coefficient.

The model-derived rate of return will then be used to price the asset correctly and the asset price should equal the expected end of period price discounted at the rate r, implied by the model. If the price diverges, arbitrage should bring it back into line.

APT can be written as;

$E(ri) = rf + \beta i1\ RP1 + \beta I2RP2 + \beta I3RP3 + \ldots\ldots + \beta in\ RPn$

Where

E(ri) is the risky asset's expected return; rf is the risk free rate; β in is the sensitivity of the asset to factor also called factor loading;

RPn is the risk premium.

However the principal concept in arbitrage pricing theory is "law of one price", that is two properties which are similar in risk and return could not be sold by various prices. When capital assets pricing model was analyzed it was in fact a simplified copy of arbitrage pricing theory which assumes only one systematic factor affects bonds return (Bodie, Kane & Marcus, 1966; 289-292).

Advocates of arbitrage pricing theory state this model has two major advantages with regard to capital assets pricing model. First is that arbitrage pricing theory proposes assumptions about preferences of the investor with regard to risk and return that some claim it has less limitation. Second, it is believed that this model could be reliable experimentally. The major problem in arbitrage pricing theory is to identify effective factors and distinguish predicted changes from unpredicted ones in measuring sensitivities. In other words, only the three following cases are essential for arbitrage pricing theory among assumptions of capital assets pricing model

- Investors look for return with balanced risk and are risk-aversive. They want to maximize their final wealth.
- Investors could receive and make a loan by risk free rate.

- There is no market limitation like transaction costs, tax or sales limitation and borrowing

2.5.1 The Emperical Overview

Literature is rich with empirical studies analyzing the relationship between stock market index and macroeconomic variables. Studies reveal strong relationships between macroeconomic variables and stock returns. Fama (1990) stated that expected inflation is negatively associated with the share price. Darrat (1990) found that budget deficits, long term bond rates, the amount of industrial production and the volatility of interest rate have an impact on the stock returns. Achsan and Strohe (2002) examined the relationship between inflation and the index of Jakart a stock exchange and concluded that inflation has a negative relationship.

Mukherjee and Naka (1995) investigated the role of macroeconomic variables on the index of Tokyo stock exchange. They found a long-term equilibrium relationship between the index of Tokyo stock exchange and macroeconomic variables such as money supply, exchange rate and long-term bond rate. These findings illuminate those of an earlier study by Chen (1991) which revealed that market excess returns can be predicted by using lagged production growth rate, Treasury bill rate, and the term structure.

2.6 Empirical Review on the Arbitrage Pricing Theory and Individual Macroeconomic Variables

In an efficient capital market, stock prices rapidly adjust according to the new information available; therefore, the stock prices reflect all information about the stocks. Thus an efficient market incorporates new information quickly and completely.

However, the dynamic relationship between stock prices and macroeconomic variables can be used to guide a nation's macroeconomic policies (Maysami et al., 2004)

Under the APT framework, the economic variables which impact future cash flows and required returns of a stock can be expected to influence share prices. A number of studies have investigated the relationship between stock returns and the state of the economy and several economic variables are found to be associated with the riskreturn of stock (Gangemi et al, 2000).

Mohamed et al., (2007) studied the effect of macroeconomic variables on stock prices in Malaysia using error correctional model. The results indicate that there is a positive relationship between inflation rate and stock price. This is in line with other studies conducted on the Malaysian equity market for the period before economic crisis (i.e., Ibrahim and Yussof (1999), Ibrahim and Aziz (2003). Engsted and Tanggaard (2002) find a moderately positive relationship between expected stock returns and expected inflation for the US and a strong positive relation for Denmark.

Mukherjee and Naka (1995) also confirmed that exchange rate positively relates to Japan and Indonesia stock prices, both two large export countries. Solnik (1987) employs monthly and quarterly data for eight industrial countries from 1973-1983 to examine the relation between real stock returns, exchange rates and reports a negative relation among variables. Using cointegration analysis, they find that the foreign exchange trade surplus, the money supply, reserves, and oil prices are important macroeconomic variables which have long run effects on the Jordanian stock market. The negative relationship between crude oil price and stock market returns confirm increases in the price of oil will market.

2.6.1 The Economic Theory on the association between Individual

Macroeconomic Variables and Stock returns

Common stock provides an expected future cash flow stream, and a stock's value is found in the same manner as the values of other financial assets; namely the present value of expected future cash flow stream. Basically, the expected cash flow formulates two components of stock returns which are the expected dividends that are paid by the company in each year and the price the investor expects to receive for selling the stock. Thus the expected final stock prices include the original investment added to the capital gain.

However the work of Chan et al., (1986) has been influential test of the multifactor model. Due to the fact that no sound and satisfactory financial theory exist to argue the relationship between financial markets and the macroeconomic variables, they employ a simple theoretical guide to help choose likely candidates for pervasive state variables. They argue that the systematic forces that influence returns are those factors that can change discount rates and expected cash flows, hence market return. They signal that Stock Prices (Po) can be written as the discounted sum of expected future dividend flows,

$$P_o = \frac{E(D_{t)}}{(1+R)^t}$$

Where P_o is the actual market price or the initial market price.

E is the expectation operator,

R is the appropriate discount rate, and $D_{t)}$ is the dividend paid at the end of "period t".

It can be posited that any economic variable, that influences expected dividends or the discount rate, affects stock prices. These factors can be separated into those which affect

future anticipated cash flows, and factors that influences the discount rate, though such a distinction will be somewhat arbitrary if one considers a complete developing and hypothetical nature of the Ghanaian economy. Expected dividends will be affected by anything, which influences cash flows.

Changes in the expected rate of inflation would affect both nominal cash flows and interest rates. Arguably, changes in cocoa prices, and industrial production would influence profits and hence dividends. Correlation between stock market returns and future growth rates of output as posited by Fama, (1981). This shows extensive evidence that relative prices change with inflation and hence sectorial and aggregate performance may change Driffill *et al*., (1989). Moreover, a change in exchange rate affects the value of foreign earnings and export performance. Further, surprises" in the current account balance, exchange rates, the money supply, output, oil prices, or even the price of gold, could all alter the outlook for interest rates, and hence the discount rate.

2.7 Macroeconomic variables and stock returns

Evidence from the financial theory suggest that as the global financial markets become more liberalized, there has been a close relationship between stock returns and the macroeconomic variables including interest rates, exchange rate, Gross Domestic Product(GDP), inflation, money supply, etc. These variables have been viewed as the most important determinants of stock market behavior as they are used to describe the state of macro economy that an investor must monitor and forecast in order to make choices regarding their investment decisions (Junkin, 2012).

Several studies have been conducted to show the impact of economic forces on stock returns in various countries. For instance arbitrage pricing theory by Ross (1976) and Chen et al. (1986) was applied to explain the impact of some macroeconomic variables

on stock return in capital markets of America. Their findings reveal that industrial productions, changes in risk premium and changes in the term structure have a positive relationship with the expected stock returns. The estimated covariance matrix of returns is employed to determine the factor structure that underlies asset return behaviour.

Estimates of the factors are determined in accordance with arbitrage pricing theory, that is, factors are calculated from the 24 features observed in the set of returns. The second form is an equilibrium model called macroeconomic variable model, which requires the arbitrary choice of a range of variables by economic intuition. Therefore the method uses pre-specified factors to estimate factor loadings and then tests whether the loadings are associated with significant risk premia.With this given the variety of methods that have been used in the literature, it is difficult to compare the results of the various studies and hence no clear-cut conclusion about the superiority of one model over the other can be drawn.

2.8 Evidence from Advanced Economies

Empirical evidence on the APT was first formulated explicitly in the 1980s, Roll and Ross (1980), Fama (1981), Chen (1983), Fama and Gibbons (1982), but implicit in earlier thinking, Lintner (1965); Mossin (1966), Modigliani and Cohn (1979), to mention just a few. Chan, Chen and Hsieh "CCH" (1985), provides one of the wellcited pioneering empirical studies using the APT framework.

Using US data, consisting of six variables including the equally weighted market index of the NYSE, changes in the condition of the economy as measured by the regularly balanced month to month growth rate of industrial production, change in expected inflation, unforeseen inflation, a measure of the changing risk premium and a measure of the adjustment in the slant of the yield bend, CCH (1985) investigate the firm size

effect for the period 1958 to 1977. After ranking the portfolios according to firm size, they use a variant of the Fama-MacBeth (1973) method to test the firm size effect. They first regress each of the 20 portfolios on the macroeconomic-variables in the first five years to estimate the variables‟ betas.

Their final results show a positive relationship for equally weighted NYSE market index, adjusted monthly growth rate of industrial production and a measure of the changing risk premium while a negative sign is reported for measure of the change in the slope of the yield curve, unanticipated inflation and change in expected inflation. Also the level of significance of the market index was found to be weak comparatively. Their results are consistent with the intuition that smaller firms are riskier than larger firms because they fluctuate more with economic expansions and contractions and concluded that the firm size anomaly is essentially captured by a multi-factor arbitrage pricing model. The higher average returns of smaller firms are justified by the additional risks borne in an efficient market.

Applying OLS technique, investigates whether expected returns depend linearly on the sensitivity of returns to changes in the systematic variables. Their findings generally are consistent with Chen et al., (1986) but reported positive instead of negative association between inflation and stock prices. Again, export volume and relative export prices as risk factors were found not to be significant.

2.9 Problem of Changing Macro-Economic Variables Significance on the Markets

According to the quantity theory of money, increase in money supply is as a result of increase in price hence money growth is expected to increase as a result of increases in the demand for money. This too an expectation increase in the rate of inflation,

consequently stock price will decrease. However money growth can stimulate the economy and increase corporate earnings as Mukherjee and Naka (1995), Kwon and Shin (1999) and Maysami and Koh (2000), reported that there is a positive relationship between money supply and stock exchange prices.

Investigating causal relationship between capital stock prices and macroeconomic activities in Fiji Chin-Hong and Jayaraman (2007). The findings of their study show that all macroeconomic variables have to contribute to the long-run equilibrium relationship as the estimation of the error correction model shows that the stock market price index is co-integrated with real economic activities in the long run, and it adjusts rather fast from short-run deviations towards long run equilibrium level. Except for rate of interest, M2, real output and rate of exchange do granger cause to the stock returns in the short-run. Finally, it is noted that potential macroeconomic variables could provide impetus to the Fiji stock market and by knowing the linkages between stock returns and macroeconomic variables, investors can obtain information to predict the movement in stock returns and government can play a more active role to stabilize fluctuations in the stock exchange market.

Mahmood, Dinniah (2009) they used Error Correction Model to analyze the multivariate causality between foreign exchange rate, CPI, industrial production index and stock prices for the countries of Japan, Malaysia, Hong Kong, Thailand, Korea, and Australia. They took sample of monthly data from January 1993 to December 2002.The findings show that there is long run equilibrium relationship exist between variables only in four countries; Japan, Korea, Australia and Hong Kong and in the short run there is no interaction in the short run relation between all above mention variables in all selected countries except between real output and stock price in Thailand and between foreign exchange rates and stock price in Hong Kong.

2.10 Evidence from Developing Countries

According to Enberg, competitive pricing system is a prerequisite for capital markets to be able to raise domestic savings and contribute more efficiently to the allocation of such savings for economic growth because competition among the users of capital markets increases efficiency. In the capital market, people are encouraged or attracted to increase their current savings because the market adds a wide range of financial assets with different and varying risk characteristics, yield and maturity periods.

An emerging market is security markets in newly industrializing countries with capital markets at early stage of development as defined by Arnold (2002). By all intents and purposes, the Ghanaian economy mimics strongly the features of an economy in transition. Sinclair, (1987) claims that although a large number of studies have investigated the association between stock returns and macroeconomic factors under the broader umbrella of APT, they are hugely concentrated in the developed markets especially of UK and US. Sinclair (1987) "s argument is that any relationship uncovered in these economies may not exist in exact form for the returns of developing stock markets like Ghana. Indeed, Fifield *et al*., (2002) corroborate this by concluding that "the empirical evidence on the role of macroeconomic factors in emerging stock markets is scarce". The rhetorical question, are they right in their claim?

Maku and Atanda (2009) further study these variables by posing a big research question: do macroeconomic indicators exert shock on the Nigerian capital market? This question aided them to examine the long-run and short-run effect of macroeconomic variables on the Nigerian capital market between 1984 and 2007.

Fifield *et al*., (2002) empirically investigates the extent to which global and local economic factors explain returns in 13 emerging stock markets (ESMs) and this

including Greece, Korea, Mexico, Portugal, Singapore, Thailand, India, Turkey, Chile, Hong Kong, Malaysia, the Philippines and South Africa from 1987–1996. This employ the method of principal components analysis, and in the spirit of Chen et al. (1986) and Goswami and Jung, (1997), selected six domestic factors; inflation, foreign exchange rates, short-term interest rates, gross domestic product, the money supply and the trade balance and six global variables of world market return, world inflation, commodity prices; world industrial production, oil prices and US interest rates. A principal components analysis is applied to a large set of domestic and world economic variables in order to reduce the dimensionality in the economic data set to a limited number of core factors and the dominant principal components are extracted and used as inputs into a regression analysis to explain index returns Goswami and

Jung, (1997). The results suggest that three domestic factors including gross domestic 37 product, inflation, money supply and short-term interest rates are priced while only global variables; world industrial production and world inflation hold significant explanatory power of stock returns.

CHAPTER THREE

METHODOLGY AND DATA

3.1 Introduction

This chapter makes emphasis on the method that was used to collect and analyze the data on this research. The significance of this study is to bring importance to researchers, academia's and students that all scientific work can be replicable and this can be done if the research gives laid down procedures as to how the study was carried out.

3.2 Scope of the study

This study investigates the effect of macroeconomic variables on stock prices. However a number of researchers in various countries have found significant relationships between macroeconomic variables and stock prices. These studies concerned multiple regression models as well as single- factor regression models which incorporate macroeconomic variables as explanatory factors of the variation in equity returns and GSE All-Share index as the independent variable. The following methodological approach is adopted in this study for establishing the relationship between macroeconomic variables and stock prices in the Emerging Ghana Stock Market.

3.3 The Sample Size and Data Source

The empirical analysis carried out using monthly data. The sample period span is from 2000-2013 and the study is carried out using 168 monthly observations which uses stock returns collected from Ghana Stock exchange being the independent variables. The macroeconomic variables to be considered include Money supply,

Exchange rate, Inflation and Interest rate(91-day t-bill rate) from 2000-2013. After identifying the last trading day of each month, the monthly prices are defined as the

natural logarithm of share prices at month t, as employed by Gjerde et al. (1998) and Chen e al 2005.However monthly data was extracted since most data on quarter and annually would not depict accuracy.

3.4 Data Sources, Variable Selection and Description

3.4.1 Data Sources

Data for the study were mainly obtained from secondary sources. Available Monthly data series that were collected include broad money supply (M2+), Cedi-US dollar exchange rate and interest rate. The broad money supply (M2+), Cedi –US dollar exchange rate and interest rate were also obtained from Bank of Ghana. Inflation rates were also obtained from the Ghana Statistical Services. Data on the index were collected from the Ghana Stock Exchange. The study covered the period 2000 to 2013 using 168 monthly data.

3.5 Variable Selection and Description

The aim of this research is to outline the factors that significantly influence the Ghanaian economy. Five macroeconomic variables have been identified to pose power to explain intuitively stock returns on the market whose works more or less have shown that these variables are correlated with stock returns but also partly due to their unique association with the Ghanaian economy. A brief description of the variables is presented below

3.5.1 Ghana Stock Exchange All-share Index (GSEI)

This serves as the dependent variable and measures the performance or returns of the stock market. This index is computed from the values of all the market's listings and thus tracks changes in the market value of the GSE.

3.5.2 Exchange Rate (EXR)

This is the price of a currency in terms of other currency. In this study, we use the Ghana cedi expressed in terms of the US dollar (that is, cedi-dollar exchange rate). Since Ghana is not in autarky, changes in the exchange rate affect the import demand, competitiveness and profitability of companies via changes in cost of production as well as changes in expected cash flow. Where the economy is import-driven, a depreciation of the Ghana cedi increases cost of production which depresses future cash flows and profits. We therefore expect a negative relationship between exchange rate and stock market performance.

3.5.3 Interest Rate (INTR)

The 91-day Treasury bill rate which is used as a proxy for the interest rate is seen as an opportunity cost of holding money. Similarly, investing in Treasury bill reflects the opportunity cost for holding shares. High interest rate makes cost of borrowing high hence negatively impacting on economic activity. Increases in the cost of loans of listed companies resulting from high lending rates undoubtedly put a depressing effect on corporate profit and dividends. Thus, increases in interest rates have indirect impact on stock prices. We therefore hypothesize a negative relationship between interest rate and stock market returns.

3.5.4 Inflation (INFL)

Increases in inflation increase the cost of living thus channeling scarce resources meant for investment to consumption. This decreases the demand for investment and stocks. We therefore hypothesize a negative relationship between inflation and equity prices.

3.5.5 Broad Money Supply (M2)

M2 is used to proxy money supply including foreign currency deposits. Thus M2 is the broad stock of money in the country. A rise in money supply increases liquidity in the economy thus making money available for consumption and investments. We therefore hypothesize a positive relationship between money supply and stock prices.

3.5.6 Dummy Variable Inclusion (DV)

The dummy variable was introduced in to the model to capture the structural changes in the trend of the All-Share-Index due to the readjustment of the stock base year from 1990 to December 2010, objectives. The zero's represents the variables before the base year and the one's representing the variables after the base year.

3.6 Method of Analysis

In this section, the research seeks to analyses time series methodologies for the dataset. However the following tests are expected to be employed: Unit root text for stationarity, multivariate cointegration text, Vector error correction model and others. 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 0.05 level of significance (95% confidence Interval).

3.6.1 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,

3.6.2 Unit Root Test

Testing for non-stationary time-series data has been one of the main developments in econometrics over the past quarter-century or so. In time series studies, when a simple linear regression model is used to analyze the relationship among non-stationary variables, it is possible that the resulting estimated equation is a spurious one. It means the "levels" of many economic time-series are integrated or nearly so, and that if such data are used in a regression model has a very high R^2 even though these variables are independent of each other. According to Stock and Watson (1989), when a model consists of non-stationary variables, the usual test statistic (t test and F test) would not have the standard distribution. Thus, it is imperative that non-stationary tests on variables should be carried out before proceeding to estimating the model. A non-stationary time series can be converted to a stationary series if differenced appropriately.

A time series, is said to be integrated of order d (has d unit roots) if it becomes stationary after being differenced d times. One of the common methods to find the order of integration of variables is the unit root test. There are numerous unit root tests. One of the most popular among them is the Augmented Dickey-Fuller (ADF) test. Augmented Dickey -Fuller (ADF) is an extension of Dickey -Fuller test. The ADF (1979, 1981) Test entails regressing the first difference of a variable y on its lagged level, exogenous variable(s) and k lagged first differences:

$$\Delta y_t = \alpha + \beta T + P_{Y_{t-1}} + \sum_{i=1}^{k} \gamma_i \Delta Y_{t-1} + e_t$$

Where $Y_t$the variable is in period t, T denotes a time trend for all t = 1, 2…216, Δ is the difference operator, e_t is an error term disturbance with mean zero and variance σ^2, and k represents the number of lags of the differences in the ADF equation. The ADF is restricted by its number of lags. It decreases the power of the test to reject the null of a unit root, because the increased number of lags necessitates the estimation of additional parameters and a loss of degree of freedom. The number of lags is being determined by minimum number of residuals free from auto correlation.

This could be examined for the standard approach such as Akaike's Information Criterion (AIC) and Schwartz Criterion (SC). The augmented specification is then used to test: H0: ρ=0 against H1: ρ<0.

The null hypothesis of unit root is rejected against the one-sided alternative if tstatistic of ρ is less than the MacKinnon critical values. This means that the variable is stationary.

3.6.3 Empirical Design (Model Specification and Estimation)

Since we anticipate that movements of stock prices among others depend on the above variables, we posit the following function where ε_t represents variables outside the model

$$GSEI_t = f(INFL_t, INTR_t, EXR_t, M2_t,) + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

To linearize equation (1), we assume a Cobb-Douglas log-linear model of the following form which is multiplicative in nature;

$$GSEI_t = \alpha_0 (INFL_t)^{\alpha_1} (INTR_t)^{\alpha_2} (EXR_t)^{\alpha_3} (M2_t)^{\alpha_4} \varepsilon_t^{u_t} \ldots\ldots\ldots (2)$$

To reduce multicollinearity and to make our equation linear, we take the natural log of equation (2) which gives;

$$GSEI_{t=\alpha_0} + \alpha_1 LINFL_t + \alpha_2 LINTL_t + \alpha_3 LEXR_t + \alpha_4 LM2_t + \mu_t \ldots\ldots (3)$$

where μ_t is the stochastic error term. Since all the variables in equation (3) are in log form, their coefficients could be interpreted as their long-run elasticities. Therefore α_1 which is the coefficient of LINFL is the elasticity of GSEI with respect to INFL. In particular, it measures the degree of responsiveness of GSEI to changes in the level of inflation *ceteris paribus.* α_2 through to α_4 also represent their respective coefficients and elasticities and thus postulate similar behaviour as α_1.From the above theoretical and empirical literature, we hypothesize the following signs for our coefficients;

$$\alpha_1 < 0, \alpha_2 < 0, \alpha_3 < 0 \; and, \alpha_4 > 0$$

Also in order to estimate the ordinary least squares (OLS), we proceed to test for stationery or unit roots of our variables. This is important in determining the order of integration of each series as well determining the number of times a series must be differenced to attain stationarity.

If the unit root test in section 3.6.2 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 DurbinWatson 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.

3.6.4 Multivariate Cointegration Test

Most macroeconomic variables are non-stationary time series, with time-dependent means and variances. However, a linear combination of non-stationary variables may be stationary. In general, a set of variables are cointegrated if a linear combination of the integrated series is stationary. This linear combination is called the cointegrating equation and reflects a long-run equilibrium relationship among the variables. Various approaches have been employed to examine for cointegration in multivariate models, for instance, Engle-Granger procedure (Engle and Granger, 1987), dynamic ordinary least squares (Stock and Watson, 1993), Johansen-Juselius procedure (Johansen and Juselius,1990) and Bounds Test (Pesaran et al., 2001).

This paper employs the Johansen-Juselius procedure to examine for cointegration. In essence, the approach is a multivariate generalization of the Augmented-DickeyFuller test (ADF). Consider a reduced form VAR of order p:

$$y_t = A_I y_{t-1} + \cdots + A_p y_{t-p} + \beta_{x_t} + u_t \ldots\ldots\ldots\ldots (4)$$

Where y_t is a k-vector of I(1) variables, x_t is a n-vector of deterministic trends, and u_t is a vector of innovations. We can rewrite this VAR as:

$$\Delta_{y_t} = \pi_{y_{t-1}} + \sum_{i=1}^{p-1} \Gamma_I \Delta_{y_{t-1}} + \beta x_t + u_t \ldots\ldots\ldots\ldots\ldots (5)$$

Where $\pi = \sum_{i=1}^{p} A_{i\,-}$ I, $\Gamma_I = -\sum_{j=t+1}^{p} A_j$

The Π matrix reveals the adjustment to disequilibrium following an exogenous shock.

If Π has reduced rank r < k where r and k indicate the rank of Π and the number of variables respectively, then there exists two k× r matrices α and β, each with rank r,

such that $\pi = \alpha\beta^I$ and $\beta^I Y_t$ is stationary.

The cointegration rank is given by r and each column of β is a cointegrating vector (depicting a long-run relationship). The elements of the α matrix represent the adjustment or loading coefficients, and give the speed of adjustment of the endogenous variables in response to disequilibrating shocks, while the elements of the Γ matrices capture the short-run dynamic adjustments. The test procedure depends on the relationships between the rank of a matrix and its characteristic roots (or eigenvalues). The rank of Π equals the number of its characteristic roots that differ from zero, which in turn corresponds to the number of cointegrating vectors. The model however uses the trace test statistics and the maximum eigenvalue test statistics to determine the number of cointegrating vectors.

3.7 Vector Error Correction Model (VECM)

The principle behind this model is that there often exists a long-run equilibrium correlation between two or more variables. In the short run, nevertheless, there may be disequilibrium. With the error correction mechanism, a proportion of the disequilibrium in one period is corrected in the next period. The error correction procedure is hence a way to reconcile short-run and long-run behavior. It relates the shift in y to the shift in x and the past period's disequilibria.

Definition by vector error correction (VEC) model is a restricted VAR which has cointegration restrictions built into the specification, to design for use with nonstationary series that are known to be cointegrated. With this VEC specification restricts the long-run behavior of the endogenous variables to change their cointegrating relationships while allowing a wide range of short-run dynamics. The error correction model is based on the following equation.

$$\Delta y_t = \beta_0 + DV_t + \beta_I e_{t-1} + \sum_{i=1}^{m} \beta_I \Delta Y_{t-1} + \sum_{i=I}^{n} \beta_j \Delta X_{t-j} + \varepsilon_t \ldots\ldots (6)$$

where e_{t-1} means the error-correction term lagged one period achieved from the cointegration equation. The error correction terms e_{t-1} will capture the speed of the short run adjustments towards the long run equilibrium. Also, DV_t is the dummy variable.

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.

CHAPTER FOUR

DISCUSSION OF RESULTS

4.0 Introduction

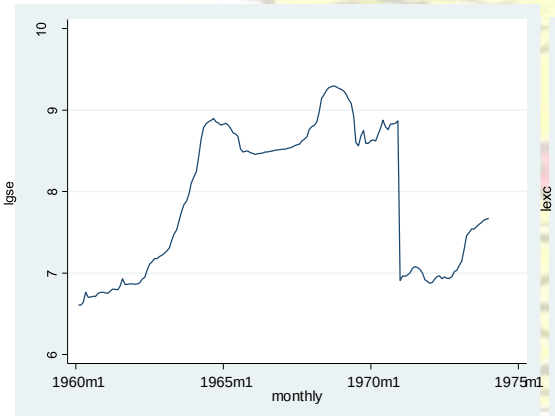
This chapter conceptualizes the empirical findings of the research which estimates the following: graphs, descriptive statistics and the Johansen Multivariate Cointegration, estimates of the Vector Error Correction Model. The results of the above therefore discuss and analyse to give meaning to the raw data used.

4.1 Exploratory Data Analysis

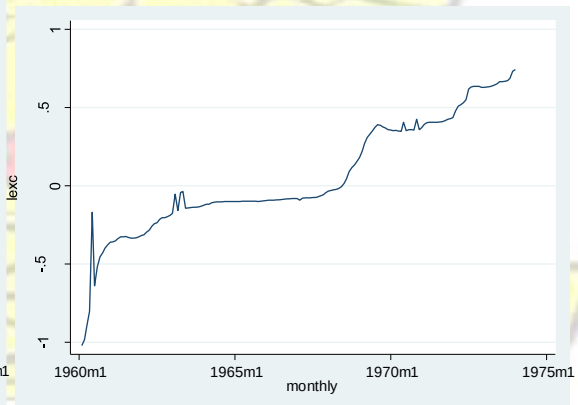
4.1.1 Graph of Time Series Plots

The Graph below shows the trend of the GSE, EXC, INF, M2 and TBR over the period January 2000 to December 2013 in natural logarithm.

lnGSE

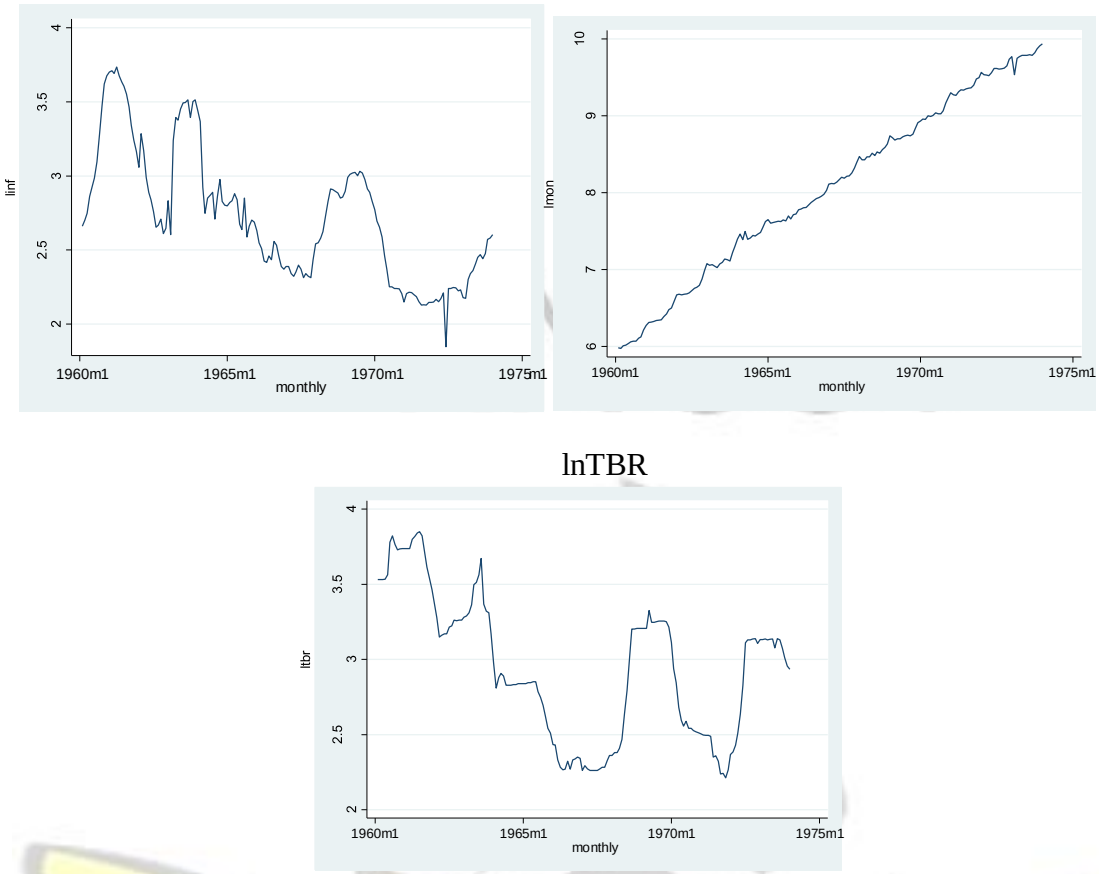


lnEXC



lnINF

lnMON



lnTBR

Figure 4.1: Time series plots of the logarithms of GSE, EXR, INF, M2, and TRB

Source: Authors computation

From Figure 4.1a, shows evidence that InGSE shows a positive trend and increases over the years under review. However, there were some fluctuations between the year 2005 to 2010 and started falling till 2013. The sharp fall in 2010 indicates the readjustment of the base year which needs to be accounted for structurally in the model. This can be deduced that there were high returns from the stock market but reduced drastically from 2010 to 2013.

The InEXR graph in Figure 4.1b shows a continuous incremental trend over the period though it showed a slight stability between year 2005 and 2010 but soared up high from the year 2011. This perhaps indicates the fact that over the period under review the exchange rate of the GHC to the USD usually does not reduce but either increases or stabilize over a period.

Also lnINF graph in figure 4.1c shows an increasing trend at the early months of 2000 till it starts to decline at 2004 and started to rise from 2005m1till it declines from 2006m1 to 2008m12 and started to rise from 2009 till 2013 albeit fluctuations. This can be attributed to the fact that at certain times between the years under review especially during electioneering year and immediately after a general election in the country where the economy is usually not stable and thus brings about high inflation.

However lnMON also graph in figure 4.1d also has its trend increasing towards the early months of 2000 up to the period of estimations. This shows money supply depicts positive attitude towards demand for money.

Also taking lnTBR in figure 4.1e serving as a proxy for interest rate indicates positive trend and increases over the year under review. However there are some fluctuations within the periods of estimations.

4.1.2 Descriptive Statistics

The descriptive statistics as evidenced in Table 4.1 reveals approximate normality in the data distribution of each variable.

Table 4.1: Summary of Descriptive statistics

VARIABLES	OBSERV	MEAN	STD. DEV.	MIN	MAX
GSE ALL SHARE	168	3879.734	2921.592	739.7	10890.8
EXCHANGE RATE	168	1.1293	0.4096	0.3605	2.101
INFLATION	168	16.9574	8.4495	6.34	41.9
MONEY SUPPLY	168	5627.733	5562.993	392.9	20691.39
T-BILL RATE	168	21.1088	10.1797	9.13	47

Source: Author's computation

The Stock market returns (Ln GSE) has an average mean of returns of 3879.734 deviating from a large standard deviation of 2921.592 supporting the general intuition that the Stock market is highly volatile. Exchange rate depicts an average mean price

of 1.129288 to the cedi equivalent and deviates from the mean of 0.409677 given a minimum and a maximum value of 0.3605 and 2.101 respectively.

Also inflation rate on the average records 16.95744 and deviates from its mean at 8.449501 giving a minimum and maximum values of 6.34 and 41.9.On the other hand average money supply which is exogenously determined by Central bank is 5627.733 deviating from its mean is 5562.993 as it minimum and maximum value depicts 392.9 and 20691.39.Lastly T-bill rate which serve as a proxy for interest rate records an average of 21.10875 over the years and the riskiness attached to investing T-bill rates is 10.17973 giving us a minimum and maximum returns of 9.13 and 47 respectively.

Table 4.2 Unit Root Test

VARAIBLES	TEST STATISTICS	5% CRITICAL VALUE	ACCEPT OR REJECT
Lgse	-1.566	-3.442	Reject H_0
Lexch	-0.685	-3.442	Reject H_o
Linf	-3.316	-3.442	Reject H_o
Lmon	-2.515	-3.442	Reject H_0
Ltbr	-2.397	-3.442	Reject H_0

Source: Author's computation

The time series property of each variable is examined using the ADF to test for stationarity (no unit root) at 5% confidence interval.

From Table 4.2, the calculated ADF statistic accepts the null hypothesis that there is unit root at 5% significance levels when compared with the respective critical values. It suffices to state that the ADF consistent is confirming the non- stationarity of each of the variable.

Table 4.2.1 Unit root after first difference

VARAIBLES	TEST STATISTICS	5% CRITICAL VALUE	DECISION I(1)
D.Lgse	-5.127	-2.886	Accept H_0
D.lexch	-5.546	-2.886	Accept H_o
D.lnfl	-4.296	-2.886	Accept H_0
D.lmon	-7.273	-2.866	Accept H_0
D ltbr	-4.442	-2.866	Accept H_o

Source: Author's computation

It is also evident from Table 4.2 that all the variables under study (i.e. LnGASI, LnEXR, LnINF, LnMON, and LnTRB are of all I (1) behaviour. The stationarity of the variables is restored on first differencing, which shows the same order as required.

4.2 Johansen Multivariate Cointegration Test Results

Table 4.3A (Trace Statistics)

Maximum rank	Trace statistics	5% critical value	No of cointegrating eqn.
0	151.8407	77.74	None (r=0)
1	53.2044 *	54.64	At most 1($r \leq 1$)
2	26.9333	34.55	At most 2 ($r \leq 2$)
3	12.0381	18.17	
4	2.8080	3.74	

Source: Author's computation

From the table the trace statistics indicates 1 cointegration equation at 5% level which explains that, the regression on the other hand is not spurious but instead proves the long run between them. The CE(s) are at most hypothesized at 1($r \leq 1$) and $2(r \leq 2)$.

However from the maximum ranking at 0 proved that the T-statistics was greater than the critical value which for that effect we accept the null hypothesis but the body of the table presents t-statistics and their critical values of the null hypothesis of no cointegration (line 1).With that the maximum ranking for the rest also proved no cointegtation which as a matter of fact we reject the null hypothesis. In conclusion we

strongly reject the null hypothesis of no cointegration and fail to reject the null hypothesis at most one cointegrating equation which we can proceed to the first differencing for the Johansen test for cointegration.

Table 4.3B (Maximum eigenvalue)

Maximum rank	Max statistics	5% critical value	No. of cointegrating eqn.
0	98.6363	36.41	. None (r=0)
1	26.2711 *	30.33	At most 1($r \leq 1$)
2	14.8952	23.78	At most 2 ($r \leq 2$)
3	9.2301	16.87	
4	2.8080	3.74	

Source: Author's computation

*(**) represents rejection of the hypothesis at the 5% level of significance where max-eigenvalue test indicate 1 cointegration equation at 5% level as the c-statistics is greater than the max statistics.

Given the evidence in favour of at least one cointegrating vector, we proceed to the first differencing to further estimate the VECM to examine the long-run causality and short-run causal linkages between the variables.

Differenced Cointegration Analysis.

Maximum rank	**Trace Statistics**	**5% Critical Values**
0	376.5626	77.74
1	155.1975	54.64
2	90.7975	34.55
3	49.4004	18.17
4	17.2406	3.74
Maximum rank	**Maximum Statistics**	**5% Critical Values**
0	221.3652	36.41
1	64.3999	30.33
2	41.3971	23.78
3	32.1598	16.87
4	17.2406	3.74

Source: Author's computation

From the first differenced, this proves that both the Trace statistics and the maximum ranking is now greater than the critical values of cointegration order of (1) at 5% confidence interval.

4.2.1 Vector Error Correction Model

Using the Vector error correction model, the research found both the long run relationship and the short run relationship among the selected macroeconomic variables and the stock market returns.

Table 4.4 Vector Error Correction Model

Variable	Coef.	Std Error	Z	p> |Z|
Constant	0.0086	0.0387	0.22	0.824
DV	-0.1501	0.0563	-2.67	0.008
Trend	0.0000	0.0004	0.10	0.924
Error Correction term	-0.0586	0.1714	-3.42	0.001
D.lgse (lag 1)	-0.0091	0.0800	-0.11	0.909
D.lgse (lag 2)	0.0332	0.7888	0.42	0.674
D.lgse (lag 3)	0.5319	0.7877	0.68	0.499
D.lexc(lag 1)	0.2596	0.2282	1.14	0.255
D.lexc (lag 2)	-0.0390	0.2498	-1.56	0.119
D.lexc (lag 3)	-0.3212	0.2293	-1.40	0.160
D.linf(lag 1)	0.0607	0.1254	0.48	0.628
D.linf (lag2)	0.0537	0.1262	0.43	0.670
D.linf (lag3)	0.0361	0.1243	0.29	0.771
D.lmon(lag 1)	-0.8849	0.3308	-2.67	0.007
D.lmon (lag 2)	-0.9844	0.3288	-2.99	0.003
D.lmon (lag 3)	-0.3407	0.3197	-1.07	0.287
D.ltbr(lag 1)	-0.0703	0.2211	-0.32	0.750
D.ltbr (lag 2)	-0.1791	0.2299	-0.78	0.436
D.ltbr (lag 3)	-0.3297	0.2209	-1.49	0.136
No.of obs.	164			
Log likelihood	1022.631			
AIC	-11.2638			
R-sq	0.1355			
P>chi^2	0.2492			

Source: Author's computation

The VECM results from Table 4.4 below points to the fact that the variables will adjust to a long-run trend. This is evident from the value of the estimated coefficient $\lambda = -0.058595$ of the error correction term ε_{t-1} at 5% level of significance which is also significant with respect to the associated t-value which explains that in the short run dynamic will adjust to the long run dynamic of the macroeconomic variables.

Form the result, it can be seen that the structural change has a high impact on the behavior of the variables as evident by the highly significant p value (0.0000).

This indicates that there is a long-run equilibrium relationship that exists among the variables and also confirms that a unidirectional long term causal flow runs from changes in Exchange rate, Inflation rate, Money supply, and T-bill rate to the Ghana Stock Exchange All-Share Index.

The result of the VECM represents a short-run relationship between the variables. The coefficients of the first (-0.884854) and second (-0.9843795) lags of the money supply variables were significant in explaining the variations in the GSE (at 5% significance). This implies that previous month's and 2 month's money supply fall would have a negative influence on current year's GSE which is indicated by their signs since a fall in money supply demand for money fall which turns to affect the prices of stocks. However all the lags of other variables were found to be insignificant in explaining the variation in the GSE.

The value of the R^2 = 0.1355 implies that about 13.55% of the variations in GSE are explained by the independent variables. This shows a very low explanatory power of the model.

Table 4.5 Johansen normalisation restriction. (Long Run Relationship)

Beta of variables	Coef.	Std err.	Z	P> |Z|
Lgse	1	.	.	.
Lexc	12.98212	1.210994	10.72	0.000
Linf	1.764408	0.4181345	4.22	0.000
Lmon	-9.498673	1.255919	-7.56	0.000
Ltbr	-3.761562	0.426655	-8.82	0.000
Constant	62.96866	.	.	.
Trend	0.1197378	.	.	.

Source: Author's computation

From Table 4.5 the Johnson normalization was used to explain the long run relationship between the independent variables and the dependent variable. All the variables were statistically significant at 1 and 5 percent.

There was a positive relationship between exchange rate and stock market performance. This implies that an increase in exchange rate will also induce an increase in stock performance. This was highly significant at 95% confidence interval.

There was also a positive relationship between inflation and stock market. Where inflation rises, firms supply more and make more profits which increase their cash flow and thereby improve their share performance. As individual shares perform better, then the general market also performs better. This was significant in stock market movements

There was a negative relationship between stocks and money supply this implies that an decrease in money supply induces a decrease in stock market performance this was highly significant in determining the movement of stocks

There was also a negative relationship between stock market movement and treasury bill rate. This is due to the inverse relationship between interest rate and stocks. An

increase in interest rate mostly makes bonds and t-bills very attractive due to its low riskiness and therefore has an adverse effect on stock markets. This was also highly significant.

CHAPTER FIVE

SUMMARY, CONCLUSION & RECOMMENDATION

Various studies have been done on the relationship between macroeconomic variables and stock market prices in previous years. However a few studies have investigated the relationships between exchange rate and stock price across a range of countries, with mixed conclusions. Solnik (1987) finds a significantly positive relationship between stock prices and exchange rates and this result is consistent with Ajayi and Mougoue (1996).

5.1 Summary of Major findings

The study used monthly data from January 2000 to December 2013. The GSE AllShare Index, the GHS to the USD Exchange rate, the inflation rate, the money supply and the 91-day Treasury bill rate representing interest rate were considered in the analysis to determine the dynamic effects of macroeconomic variable changes on GSE market returns.

The major findings in the study are summarised below:

- The study found a long-run relationship (cointegration) among the series.
- Also on the contrary, the study identified a long-run negative relationship between money supply and stock prices which was empirically confirmed.
- Again, a theoretically expected positive long-run relationship was empirically confirmed between inflation and stock prices in this study.
- Nevertheless, a theoretical positive relationship between exchange rate and stock prices.
- Moreover, a negative long run relationship was empirically found between Tbill rate which serve as a proxy for interest rate and stock prices.

5.2 Conclusion

This study has investigated the impact macroeconomic variables on Ghana Stock Exchange All Share index. The study further examined the causal relationships among the considered series. The empirical methodology uses the Johansen's multivariate cointegration test (Johansen and Juselius, 1990) together with the Vector Error Correction term to examine possible long-run and short-run effects among the involved series as well as the direction of these effects. The study used monthly data for the period 2000:01-2013:12 obtained mainly from the Ghana Stock Exchange (GSE) and the Bank of Ghana.

The Augmented Dickey-Fuller (ADF) test, an econometric technique, was used to examine the unit roots of the involved variables, which were all on the natural logarithm (Ln) scale. The study then proceeded to find whether there are any long and short run relationships after all the variables were found to have unit roots – integrated of order one I (1). The cointegration tests revealed that there is one unique cointegrating vector, implying there is one unique long-run relationship among stock prices and macroeconomic variables for the period of study. Cointegration evidence indicated and thus confirmed a long-run negative relationship between T-bill rates used as a proxy of interest rate and stock prices and also positive between inflation rates and stock prices. It also indicated positive and negative relationships between exchange rate and stock prices and also between money supply and stock prices respectively.

Alternative time invariant technique, constructed out of 760 UK securities. They grouped the portfolios according to the average return unlike Chen et al., (1986).

5.3 Recommendations

Based on the results of the findings, the research recommends that:

The 91-day T-bill rate, money supply, inflation and the cedi-dollar exchange rate are priced by the market. However inflation and exchange rate were positively correlated with stock returns whereas T-bill rate and money supply were also negatively correlated with stock returns. With this improvement in inflation and exchange rate signal the possibility of earning higher returns and this serves an optimal investment strategy on GSE may be that investors should buy shares immediately improvement of these macro variables and vice versa.

Also T-bill rate and money supply founding to be negative correlated with stock market return on GSE poses the potential of limiting stock market return and growth.

With this investors are advised to also consider other factors like inflation 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

This is expected to boost the economy and allow Ghanaians to also reap some of the profits. In view of that, the GSE can be more attractive than the other investment instrument like exchange rates market and the treasury bills. This is because investors see Treasury bills as alternative assets to GSE stocks and would switch to the Treasury bills if the rate of returns from the GSE is lower. The government must also continue to ensure that prudent measures are put in place to ensure that inflation rates are kept low to keep the levels of interest rate stable over a period of time which will as such move in the same direction as the stock market. 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.

5.4 Suggestions for Further Research

The research initially attempted to include the interbank interest rate for the study. However, due to the limited time available and low rate of response, this could not be done. It is therefore be compelled to perform an empirical analysis using a wide range of data of the interbank interest rate on deposits to know if those who save in Ghana commonly invest their savings in bank deposits for higher interest rate with certainty when investment on the stock market does not seem profitable to them. Lastly, other macroeconomic variables like inflation, consumer price index, Money supply etc. can be used as variables to determine its effect on GSE index to be able to determine if there is a general long term or short term effect of these macroeconomic variables on stock market returns in Ghana.

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APPENDICES

Summary statistics

```
. summarize gseallshare exchangeratedollartocedi infoverall
moneysupplym2 tbr91day
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Variable	Obs	Mean	Std. Dev.	Min	Max
gseallshare	168	3879.734	2921.592	739.7	10890.8
exchangera~i	168	1.129288	.4096277	.3605	2.101
infoverall	168	16.95744	8.449501	6.34	41.9
moneysuppl~2	168	5627.733	5562.993	392.9	20691.39
tbr91day	168	21.10875	10.17973	9.13	47

Lag length determination

Selection-order criteria
Sample: 1960m12 - 1974m1 Number of obs = 158

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-211.889				.000011	2.74544	2.78479	2.84235
1	1054.38	2532.5	25	0.000	1.6e-12	-12.9668	-12.7307	-12.3853*
2	1095.42	82.088	25	0.000	1.3e-12	-13.1699	-12.737*	-12.1038
3	1117.13	43.421	25	0.013	1.4e-12	-13.1283	-12.4985	-11.5776
4	1147.52	60.775	25	0.000	1.3e-12*	-13.1965*	-12.3699	-11.1612
5	1158.55	22.058	25	0.632	1.5e-12	-13.0196	-11.9963	-10.4998
6	1173.66	30.226	25	0.216	1.8e-12	-12.8945	-11.6743	-9.89003
7	1188.35	29.368	25	0.249	2.1e-12	-12.7639	-11.347	-9.27486
8	1205.63	34.557	25	0.097	2.3e-12	-12.6662	-11.0524	-8.69253
9	1230.54	49.823	25	0.002	2.4e-12	-12.665	-10.8545	-8.20683
10	1249.92	38.767*	25	0.039	2.6e-12	-12.5939	-10.5866	-7.65114

AUGMENTED DICKEY FULLER TEST

```
. dfuller ln_gse, trend lags(4)

Augmented Dickey-Fuller test for unit root         Number of obs   =       163

                                                 ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical     10% Critical
                 Statistic       Value             Value          Value
------------------------------------------------------------------------------
 Z(t)             -1.566          -4.019            -3.442          -3.142
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.8053

. dfuller ln_excha, trend lags(4)
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```
Augmented Dickey-Fuller test for unit root         Number of obs   =       163

                                 ---------- Interpolated Dickey-Fuller
                   Test         1% Critical       5% Critical      10% Critical
Statistic           Value             Value             Value

 Z(t)             -0.685            -4.019            -3.442            -3.142

MacKinnon approximate p-value for Z(t) = 0.9741

. dfuller ln_inf, trend lags(4)

Augmented Dickey-Fuller test for unit root         Number of obs   =       163

                                 ---------- Interpolated Dickey-Fuller
                   Test         1% Critical       5% Critical      10% Critical
Statistic           Value             Value             Value

 Z(t)             -3.316            -4.019            -3.442            -3.142

MacKinnon approximate p-value for Z(t) = 0.0637
. dfuller ln_m2, trend lags(4)

Augmented Dickey-Fuller test for unit root         Number of obs   =       163

                                 ---------- Interpolated Dickey-Fuller
                   Test         1% Critical       5% Critical      10% Critical
Statistic           Value             Value             Value

 Z(t)             -2.515            -4.019            -3.442            -3.142

MacKinnon approximate p-value for Z(t) = 0.3204
. dfuller ln_tbr, trend lags(4)

Augmented Dickey-Fuller test for unit root         Number of obs   =
163

                                 ---------- Interpolated Dickey-Fuller
                   Test         1% Critical       5% Critical      10%
Critical         Statistic           Value             Value
Value

 Z(t)             -2.397            -4.019            -3.442            -
3.142

MacKinnon approximate p-value for Z(t) = 0.3811
```

DIFFERENCED AUGMENTED DICKEY FULLER

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. dfuller D.ln_gse, lags(4)
```

Augmented Dickey-Fuller test for unit root Number of obs = 162

	Test	Interpolated Dickey-Fuller 1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value	
Z(t)	-5.127	-3.489	-2.886	-2.576

MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller D.ln_excha, lags(4)

Augmented Dickey-Fuller test for unit root Number of obs = 162

	Test	Interpolated Dickey-Fuller 1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value	
Z(t)	-5.546	-3.489	-2.886	-2.576

MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller D.ln_inf, lags(4)

Augmented Dickey-Fuller test for unit root Number of obs = 162

	Test	Interpolated Dickey-Fuller 1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value	
Z(t)	-4.296	-3.489	-2.886	-2.576

MacKinnon approximate p-value for Z(t) = 0.0005

. dfuller D.ln_m2, lags(4)

Augmented Dickey-Fuller test for unit root Number of obs = 162

	Test	Interpolated Dickey-Fuller 1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value	
Z(t)	-7.273	-3.489	-2.886	-2.576

MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller D.ln_tbr, lags(4)

Augmented Dickey-Fuller test for unit root Number of obs = 162

	Test	Interpolated Dickey-Fuller 1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value	

```
 Z(t)             -4.442            -3.489            -2.886            -2.576

MacKinnon approximate p-value for Z(t) = 0.0002
```

JOHANSEN COINTEGRATION ANALYSIS

```
. vecrank ln_gse ln_excha ln_inf ln_m2 ln_tbr, trend(trend) lags(4) max

                        Johansen tests for cointegration
Trend: trend                                         Number of obs =      164
Sample:  1960m6 - 1974m1                                   Lags =          4


5% maximum                                            trace
critical    rank     parms       LL       eigenvalue
statistic    value      0       85       969.48851
.     151.8407    77.74
1       94       1018.8067     0.45198      53.2044*    54.64
2       101      1031.9422     0.14802      26.9333     34.55
3       106      1039.3898     0.08682      12.0381     18.17
4       109      1044.0049     0.05473       2.8080      3.74
5       110      1045.4089     0.01698


5% maximum                                             max
critical    rank     parms       LL       eigenvalue
statistic    value      0       85       969.48851
.      98.6363    36.41
1       94       1018.8067     0.45198      26.2711     30.33
2       101      1031.9422     0.14802      14.8952     23.78
3       106      1039.3898     0.08682       9.2301     16.87      4       109
        1044.0049      0.05473       2.8080      3.74
     5       110      1045.4089      0.01698
```

DIFFERENCED COINTEGRATION ANALYSIS.

```
. vecrank D.ln_gse D.ln_excha D.ln_inf D.ln_m2 D.ln_tbr, trend(trend) lags(4) max

                        Johansen tests for cointegration
Trend: trend                                         Number of obs =      163
Sample:  1960m7 - 1974m1                                   Lags =          4


                                                              5% maximum
trace     critical    rank     parms       LL       eigenvalue  statistic
value      0       85       929.13769          .     376.5626     77.74
1        94       1039.8203     0.74284     155.1975     54.64
2        101      1072.0202     0.32638      90.7975     34.55
3        106      1092.7188     0.22429      49.4004     18.17
4        109      1108.7987     0.17906      17.2406      3.74
5        110       1117.419     0.10037


                                                              5% maximum
max       critical    rank     parms       LL       eigenvalue  statistic
value      0       85       929.13769          .     221.3652     36.41
1        94       1039.8203     0.74284      64.3999     30.33
```

2	101	1072.0202	0.32638	41.3971	23.78
3	106	1092.7188	0.22429	32.1598	16.87
4	109	1108.7987	0.17906	17.2406	3.74
5	110	1117.419	0.10037		

.

VECTOR ERROR CORRECTION MODEL

```
. vec ln_gse ln_excha ln_inf ln_m2 ln_tbr, trend(trend) lags(4) sindicators(dv)

Vector error-correction model

Sample:  1960m6 - 1974m1                        No. of obs      =       164
                                                AIC             = -11.26379
Log likelihood =  1022.631                      HQIC            = -10.50413
Det(Sigma_ml)  =  2.64e-12                      SBIC            = -9.392531

Equation           Parms      RMSE     R-sq      chi2     P>chi2

D_ln_gse              19     .163611   0.1355   22.73452   0.2492
D_ln_excha            19     .048993   0.5285   162.5166   0.0000
D_ln_inf              19     .105416   0.1505   25.68474   0.1392
D_ln_m2               19     .043931   0.2983   61.64366   0.0000
D_ln_tbr              19     .062346   0.3543   79.55204   0.0000
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_ln_gse						
_ce1						
L1.	-.058595	.0171427	-3.42	0.001	-.0921941	-.0249958
ln_gse						
LD.	-.0091307	.0799752	-0.11	0.909	-.1658794	.1476179
L2D.	.0331533	.0788796	0.42	0.674	-.1214479	.1877545
L3D.	.0531882	.078765	0.68	0.499	-.1011884	.2075647
ln_excha						
LD.	.2595542	.2281643	1.14	0.255	-.1876395	.706748
L2D.	-.3898473	.2497978	-1.56	0.119	-.879442	.0997475
L3D.	-.3217712	.2292553	-1.40	0.160	-.7711034	.127561
ln_inf						
LD.	.0607358	.1254167	0.48	0.628	-.1850763	.3065479
L2D.	.0537099	.1261567	0.43	0.670	-.1935526	.3009724
L3D.	.0361112	.1242933	0.29	0.771	-.2074993	.2797217
ln_m2						
LD.	-.884885	.3308434	-2.67	0.007	-1.533326	-.2364439
L2D.	-.9843795	.3288248	-2.99	0.003	-1.628864	-.3398947
L3D.	-.340662	.3196703	-1.07	0.287	-.9672043	.2858802
ln_tbr						
LD.	-.0703307	.2210507	-0.32	0.750	-.503582	.3629207
L2D.	-.1790896	.2298676	-0.78	0.436	-.6296219	.2714427
L3D.	-.329712	.2209044	-1.49	0.136	-.7626766	.1032527

	-.1500535	.0562628	-2.67	0.008	-.2603265	-.0397805
dv						
_trend	.0000389	.000409	0.10	0.924	-.0007627	.0008406
_cons	.0085995	.0387327	0.22	0.824	-.0673152	.0845142

D_ln_m2						
_ce1						
L1.	.0057686	.0046029	1.25	0.210	-.0032529	.0147902
ln_gse LD.	.0104287	.0214738	0.49	0.627	-.0316591	.0525166
L2D.	.0174789	.0211796	0.83	0.409	-.0240323	.0589902
L3D.	-.0161825	.0211488	-0.77	0.444	-.0576335	.0252685
ln_excha						
LD.	-.0324416	.0612634	-0.53	0.596	-.1525156	.0876324
L2D.	-.0180649	.0670721	-0.27	0.788	-.1495238	.113394
L3D.	-.0287501	.0615563	-0.47	0.640	-.1493983	.0918981
ln_inf LD.	-.014406	.0336751	-0.43	0.669	-.0804079	.0515959
L2D.	.0003764	.0338738	0.01	0.991	-.0660149	.0667678
L3D.	.0214577	.0333735	0.64	0.520	-.0439531	.0868685
ln_m2 LD.	-.1053121	.0888333	-1.19	0.236	-.2794221	.068798
L2D.	-.0198493	.0882913	-0.22	0.822	-.192897	.1531985
L3D.	-.1070276	.0858333	-1.25	0.212	-.2752577	.0612025
ln_tbr LD.	.0014917	.0593533	0.03	0.980	-.1148387	.1178221
L2D.	-.0567462	.0617207	-0.92	0.358	-.1777166	.0642242
L3D.	.0319767	.0593141	0.54	0.590	-.0842767	.1482302
dv	.0097913	.0151069	0.65	0.517	-.0198177	.0394002
_trend	-.000074	.0001098	-0.67	0.500	-.0002893	.0001412
_cons	.0420756	.0103999	4.05	0.000	.0216921	.0624591

D_ln_tbr						
_ce1						
L1.	.0049297	.0065325	0.75	0.450	-.0078737	.017733
ln_gse LD.	.0055041	.0304755	0.18	0.857	-.0542269	.0652351
L2D.	.003573	.030058	0.12	0.905	-.0553397	.0624856
L3D.	.0255978	.0300144	0.85	0.394	-.0332293	.0844249
ln_excha						
LD.	.2618968	.0869448	3.01	0.003	.0914882	.4323055
L2D.	.2099246	.0951885	2.21	0.027	.0233585	.3964907
L3D.	.1447291	.0873606	1.66	0.098	-.0264944	.3159527
ln_inf LD.	-.0212928	.0477916	-0.45	0.656	-.1149625	.0723769
L2D.	.0838344	.0480735	1.74	0.081	-.010388	.1780568
L3D.	-.0026975	.0473635	-0.06	0.955	-.0955283	.0901332
ln_m2 LD.	-.0474492	.1260719	-0.38	0.707	-.2945456	.1996473
L2D.	-.0894435	.1253027	-0.71	0.475	-.3350323	.1561454
L3D.	.0826896	.1218143	0.68	0.497	-.156062	.3214412
ln_tbr LD.	.3761004	.0842341	4.46	0.000	.2110046	.5411961

L2D.	.0702779	.0875939	0.80	0.422	-.1014029	.2419588
L3D.	.0884304	.0841783	1.05	0.293	-.0765561	.2534169
dv	.011405	.0214396	0.53	0.595	-.0306158	.0534259
_trend	.0000958	.0001559	0.61	0.539	-.0002096	.0004013
_cons	-.0104716	.0147596	-0.71	0.478	-.0393999	.0184566

D_ln_excha						
_ce1						
L1.	-.04708	.0051334	-9.17	0.000	-.0571412	-.0370187
ln_gse						
LD.	.0055749	.0239485	0.23	0.816	-.0413633	.052513
L2D.	.0012822	.0236204	0.05	0.957	-.0450129	.0475773
L3D.	-.0006908	.0235861	-0.03	0.977	-.0469186	.0455371
ln_excha						
LD.	-.3122667	.0683235	-4.57	0.000	-.4461783	-.1783551
L2D.	-.1825037	.0748016	-2.44	0.015	-.3291122	-.0358952
L3D.	-.0764286	.0686502	-1.11	0.266	-.2109805	.0581234
ln_inf						
LD.	.1021663	.0375559	2.72	0.007	.0285582	.1757745
L2D.	.0440972	.0377774	1.17	0.243	-.0299453	.1181396
L3D.	-.0177787	.0372195	-0.48	0.633	-.0907276	.0551701
ln_m2						
LD.	-.3347396	.0990706	-3.38	0.001	-.5289144	-.1405648
L2D.	-.2132199	.0984662	-2.17	0.030	-.40621	-.0202297
L3D.	-.2123948	.0957249	-2.22	0.026	-.4000121	-.0247776
ln_tbr						
LD.	-.0803573	.0661933	-1.21	0.225	-.2100939	.0493792
L2D.	-.1093995	.0688336	-1.59	0.112	-.2443108	.0255118
L3D.	-.1137033	.0661495	-1.72	0.086	-.243354	.0159474
dv	-.080508	.0168478	-4.78	0.000	-.1135291	-.0474869
_trend	-8.14e-06	.0001225	-0.07	0.947	-.0002482	.0002319
_cons	-.0152766	.0115985	-1.32	0.188	-.0380092	.0074559
D_ln_inf						
_ce1						
L1.	-.02102	.0110452	-1.90	0.057	-.0426681	.0006282
ln_gse						
LD.	-.0117068	.0515286	-0.23	0.820	-.112701	.0892874
L2D.	.0063521	.0508227	0.12	0.901	-.0932585	.1059627
L3D.	-.0016799	.0507488	-0.03	0.974	-.1011458	.097786
ln_excha						
LD.	.2200093	.1470078	1.50	0.135	-.0681207	.5081394
L2D.	.0593989	.1609465	0.37	0.712	-.2560504	.3748482
L3D.	-.0109277	.1477108	-0.07	0.941	-.3004355	.2785802
ln_inf						
LD.	-.0761385	.0808068	-0.94	0.346	-.2345169	.08224
L2D.	.0241034	.0812836	0.30	0.767	-.1352096	.1834163
L3D.	.1316066	.0800831	1.64	0.100	-.0253533	.2885665

ln_m2						
LD.	-.1289947	.2131647	-0.61	0.545	-.5467898	.2888004
L2D.	-.153953	.2118641	-0.73	0.467	-.5691991	.261293
L3D.	.098872	.2059658	0.48	0.631	-.3048135	.5025575
ln_tbr						
LD.	.1303699	.1424245	0.92	0.360	-.1487769	.4095168
L2D.	.163134	.1481053	1.10	0.271	-.1271471	.4534151
L3D.	.0758185	.1423302	0.53	0.594	-.2031437	.3547806
	-.0230416	.0362505	-0.64	0.525	-.0940913	.048008
dv						
_trend	-.0000881	.0002635	-0.33	0.738	-.0006047	.0004284
_cons	-.0156937	.0249558	-0.63	0.529	-.064606	.0332187

Cointegrating equations

Equation	Parms	chi2	P>chi2
_ce1	4	126.473	0.0000

Identification: beta is exactly identified

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1	1	.	.	.	.	.
ln_gse						
ln_excha	12.98212	1.210994	10.72	0.000	10.60861	15.35562
ln_inf	1.764408	.4181345	4.22	0.000	.9448796	2.583937
ln_m2	-9.498673	1.255919	-7.56	0.000	-11.96023	-7.037118
ln_tbr	-3.761562	.426655	-8.82	0.000	-4.59779	-2.925334
_trend	.1197378	.	.	.	.	.
_cons	62.96866	.	.	.	.	.

ln_excha						
ln_gse						
L1.	-.005754	.0243655	-0.24	0.813	-.0535095	.0420015
L2.	-.0085662	.0316155	-0.27	0.786	-.0705314	.0533991
L3.	-.0034435	.0314196	-0.11	0.913	-.0650248	.0581378
L4.	.006139	.0220537	0.28	0.781	-.0370854	.0493633
ln_excha						
L1.	.0663048	.0750605	0.88	0.377	-.0808112	.2134208
L2.	.1145124	.0736903	1.55	0.120	-.029918	.2589428
L3.	.1113643	.0698538	1.59	0.111	-.0255466	.2482751
L4.	.0809442	.0653102	1.24	0.215	-.0470615	.2089498
ln_inf						
L1.	.0218401	.0369113	0.59	0.554	-.0505048	.0941849
L2.	-.0619801	.0477284	-1.30	0.194	-.155526	.0315658
L3.	-.0619136	.0486412	-1.27	0.203	-.1572486	.0334214
L4.	.0301723	.0358998	0.84	0.401	-.0401901	.1005348
ln_m2						
L1.	.0110008	.0856551	0.13	0.898	-.1568801	.1788817
L2.	.093386	.111465	0.84	0.402	-.1250813	.3118534
L3.	-.0062275	.1112381	-0.06	0.955	-.2242502	.2117951
L4.	.0896266	.0871622	1.03	0.304	-.0812082	.2604615
ln_tbr						
L1.	.1087654	.0621971	1.75	0.080	-.0131388	.2306695
L2.	-.0538079	.1024061	-0.53	0.599	-.25452	.1469043
L3.	-.0159857	.1016488	-0.16	0.875	-.2152136	.1832423
L4.	.1233141	.0630206	1.96	0.050	-.000204	.2468323
dv	.00196	.0274169	0.07	0.943	-.0517762	.0556962
_cons	-1.637795	.1999661	-8.19	0.000	-2.029722	-1.245869

ln_inf						
ln_gse						
L1.	.0167927	.0503729	0.33	0.739	-.0819364	.1155218
L2.	.0131275	.0653614	0.20	0.841	-.1149786	.1412335
L3.	-.012712	.0649564	-0.20	0.845	-.1400243	.1146002
L4.	.0101984	.0455934	0.22	0.823	-.0791631	.0995598
ln_excha						
L1.	-.0616389	.1551791	-0.40	0.691	-.3657843	.2425065
L2.	-.1510102	.1523463	-0.99	0.322	-.4496035	.1475831
L3.	-.0006371	.1444146	-0.00	0.996	-.2836846	.2824103
L4.	.0995723	.1350214	0.74	0.461	-.1650647	.3642094
ln_inf						
L1.	.8051959	.0763099	10.55	0.000	.6556312	.9547606
L2.	.0875549	.098673	0.89	0.375	-.1058405	.2809503
L3.	.0966749	.1005601	0.96	0.336	-.1004192	.293769
L4.	-.2039966	.0742188	-2.75	0.006	-.3494628	-.0585304
ln_m2						
L1.	-.0131024	.1770821	-0.07	0.941	-.3601769	.3339721
L2.	-.028709	.2304411	-0.12	0.901	-.4803652	.4229472
L3.	.2452422	.229972	1.07	0.286	-.2054947	.695979
L4.	-.2163636	.1801979	-1.20	0.230	-.569545	.1368177

ln_tbr						
L1.	.2294167	.1285854	1.78	0.074	-.0226062	.4814395
L2.	.0389906	.2117128	0.18	0.854	-.3759587	.45394
L3.	-.1040118	.2101472	-0.49	0.621	-.5158928	.3078691
L4.	-.0167908	.1302879	-0.13	0.897	-.2721504	.2385688
dv	.0258307	.0566814	0.46	0.649	-.0852627	.1369241
_cons	.0392841	.4134069	0.10	0.924	-.7709786	.8495468

ln_m2						
ln_gse						
L1.	.0117922	.0220903	0.53	0.593	-.031504	.0550883
L2.	.0090637	.0286633	0.32	0.752	-.0471153	.0652427
L3.	-.0342795	.0284857	-1.20	0.229	-.0901105	.0215514
L4.	.0160648	.0199943	0.80	0.422	-.0231234	.0552529
ln_excha						
L1.	-.0107406	.0680515	-0.16	0.875	-.1441191	.1226378
L2.	-.0124984	.0668092	-0.19	0.852	-.1434421	.1184453
L3.	-.0082669	.0633309	-0.13	0.896	-.1323932	.1158594
L4.	.0567114	.0592116	0.96	0.338	-.0593413	.172764
ln_inf						
L1.	-.0232522	.0334646	-0.69	0.487	-.0888416	.0423372
L2.	.016012	.0432716	0.37	0.711	-.0687987	.1008227
L3.	.0161403	.0440991	0.37	0.714	-.0702924	.102573
L4.	-.0301227	.0325476	-0.93	0.355	-.0939148	.0336693
ln_m2	L1.	.8460733	.0776567	10.90	0.000	.6938689	.9982777
L2.	.0919452	.1010565	0.91	0.363	-.1061219	.2900124
L3.	-.0779184	.1008508	-0.77	0.440	-.2755824	.1197456
L4.	.1253705	.0790231	1.59	0.113	-.029512	.2802529
ln_tbr						
L1.	-.0085737	.0563892	-0.15	0.879	-.1190945	.1019472
L2.	-.0564052	.0928435	-0.61	0.543	-.2383752	.1255647
L3.	.0820665	.092157	0.89	0.373	-.0985579	.2626908
L4.	-.0073087	.0571358	-0.13	0.898	-.1192929	.1046755
dv	-.0019718	.0248568	-0.08	0.937	-.0506902	.0467466
_cons	.1568389	.1812935	0.87	0.387	-.1984899	.5121676

ln_tbr						
ln_gse						
L1.	-.0012129	.0299373	-0.04	0.968	-.0598889	.0574631
L2.	-.0026478	.0388452	-0.07	0.946	-.0787829	.0734874
L3.	.0248034	.0386045	0.64	0.521	-.05086	.1004668
L4.	-.0347656	.0270968	-1.28	0.199	-.0878743	.0183431
ln_excha						
L1.	.3456294	.092225	3.75	0.000	.1648717	.526387
L2.	-.0307516	.0905415	-0.34	0.734	-.2082096	.1467065
L3.	-.0786048	.0858276	-0.92	0.360	-.2468237	.0896141
L4.	-.1989275	.080245	-2.48	0.013	-.3562049	-.0416501
ln_inf						
L1.	.0013268	.045352	0.03	0.977	-.0875615	.0902151
L2.	.1117495	.0586427	1.91	0.057	-.003188	.2266871
L3.	-.0705817	.0597642	-1.18	0.238	-.1877174	.0465539

L4.	-.0038883	.0441092	-0.09	0.930	-.0903408	.0825642
ln_m2						
L1.	-.0742881	.1052423	-0.71	0.480	-.2805591	.131983
L2.	-.0485976	.1369542	-0.35	0.723	-.317023	.2198278
L3.	.1639893	.1366755	1.20	0.230	-.1038897	.4318683
L4.	-.0464676	.107094	-0.43	0.664	-.256368	.1634329
ln_tbr						
L1.	1.283769	.0764201	16.80	0.000	1.133988	1.433549
L2.	-.2609014	.1258238	-2.07	0.038	-.5075114	-.0142914
L3.	.0518525	.1248933	0.42	0.678	-.192934	.2966389
L4.	-.1522577	.0774319	-1.97	0.049	-.3040214	-.000494
	-.0084807	.0336865	-0.25	0.801	-.074505	.0575436
dv						
_cons	.2674901	.2456933	1.09	0.276	-.21406	.7490401