THE IMPACT OF MACROECONOMIC VARIABLES ON GHANA STOCK EXCHANGE.

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DECLARATION:

I hereby declare that this submission is my own work towards the completion of my MBA programme and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any degree of the University, except where due acknowledgement has been made..

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DEDICATION

This dissertation is dedicated to the Almighty God who has helped me to surmount the obstacles that came my way during the preparation of this work and my entire family.

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ABSTRACT

The relationship between share prices and macroeconomic variables is well documented for the United States and other major economies. Although these empirical evidences exist some where, it is difficult and may be unreliable apply the same findings to Ghana stock exchange which is emerging market in developing economy, It is therefore , necessary to conduct an empirical studies to find the relationship between share prices and economic variables in Ghana.

The goal of this study is to investigate the impact of macroeconomic variables of exchange rate, interest rate and inflation on share price in Ghana by the application of Johansen cointegration analysis through vector error correction model. Treasury bill and Databank stock index (DSI) were used to proxy for short term interest and share price respectively.

The empirical results show that the stock prices and macroeconomics variables have long-term equilibrium and short term relationship and that all the macro-economic variables were negatively related to the stock market index(share price.)..

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CHAPTER ONE

1.0. GENERAL INTRODUCTION

1.1 INTRODUCTION:

The purpose of this study is to investigate the impact of some macroeconomic variables on the performance of the Ghana stock exchange. The specific macroeconomic variables considered for this study are interest rate, exchange rate and inflation rate. These variables are considered in many studies to have some varying effect on the stock performance (share price).

In view of this, it is important to carry out empirical studies to find the relationship between these important macro-economic variables and the stock index in Ghana. The identification of the relation will help stakeholders to make good investment decisions in Ghana.

1.2 BACKGROUND OF THE STUDY:

Recently the interest of Ghanaians in Ghana stock exchange has increase tremendously. With the Treasury bill rate unattractive, the attention of the public has been drawn to stock exchange investment. The oversubscription of UT financial services and Ecobank Transnational Incorporation shares recently is a clear evidence of this fact.

At both the academic and non-academic circles there is greater concern about the dynamics of stock investment. Individuals investors are being urged to invest in stocks whiles firms are also being advice to go public, by investment advisors, because of the numerous advantages they could get among which is securing long term capital. Financial experts hold the view that stock market provides an added dimension of investment opportunity for both individuals and institutional investors which go on a long way to promote economic growth, hence large corporations in Ghana including AGC have made considerable use of the Ghana stock market to finance their growth.

Seeing the important role stock exchange plays in promoting rapid economic growth, over the past two decades, many Sub Sahara African countries have been making serious effort at restructuring and developing their capital market. All these reformations and development are all directed at shifting their financial systems from one of bank-based to security market-based, thereby leading to the establishment of many stock markets of which Ghana is no exception. (see Frimpong and Oteng-Abayie, 2006).

As part of the financial sector reforms in Ghana, the Ghana government has renewed it effort at stabilizing the economy. Financial-economists believe that stable macro-economy will help open access to capital for corporate bodies and, in return investors get, greater gains for their investment. As part of the renewed efforts aimed at promoting investments on the Ghana stock market the GSE has started its automation and considering establishment of commodity market on the Ghana stock exchange. Ghana's economy with less developed financial market is characterized by unstable macroeconomic factors.

Modern financial theory focuses upon systematic factors as sources of risk and postulates that the long run return on an individual asset must reflect the changes in such systematic factors. This implies that securities market must have a significant relationship with real and financial sectors of the economy. This relationship generally viewed in two ways. The first relationship views the stock market as the leading indicator of the economic activity in the country, whereas the second focuses on the possible impact the stock market may have on aggregate demand, particularly through aggregate consumption and investment. The former case implies that stock market leads economic activity, whereas the latter suggests that it lags economic activity.

Knowledge of the sensitivity of stock market to macro economic behavior of key variables is important in many areas of investments and finance. The argument is that macroeconomic

factors generally affect businesses earnings. Ross, et al, 2002, revealed that general economic conditions classified as systematic risk have significant impact on nearly all stocks to some degree.

Several researchers have shown that macroeconomic factors may cause systematic risk. For example, Elsinger et al (2002) showed that systematic risk is the consequence of macroeconomic shocks such as interest rate, exchange rate, and business cycles.

Accordingly, an unanticipated or surprise increase in inflation and interest rates affects the cost of borrowing, recurrent expenditures, the costs of acquiring new assets, debt obligations especially when the interest rate is floating and the value of the assets companies own.

Among some of the theories in the field of corporate finance, that establishes a relationship between macroeconomic factors and stock prices is the arbitrage pricing theory.

In the arbitrage pricing theory (APT), introduced by Ross (1976,1977) as a theoretical alternative to the Capital Asset Pricing Model (CAPM) , the influence of macroeconomic variables on stock's return was captured by Beta coefficients. In the follow up research to ascertain the validity of the APT, Chen, Roll and Ross (1986), also found that several macroeconomic variables significantly affected the expected stock return of US stock.

Modigliani and Cohn (1979) have shown that share price is inversely related to expected return which takes into accounts inflation and interest rate. The conclusions from early studies conducted by Nelson (1976), and Jaffe and Mandelker (1976), have all affirmed that macroeconomic variables influence stock returns.

Lee (1992), using postwar U.S. data, shows that stock returns explained a substantial fraction of the variance in real activity. He found that a positive relationship between stock returns and lagged economic activity exists

Recently, Humpe and Macmillan (2007) examined the influence of a number of macroeconomic variables on stock prices in the US and Japan using cointegration analysis and found out the existence of long run relationship between stock price and macroeconomic factors in both countries. Although, the above early studies conduct else where have all shown a cointegration relationship between stock price and macroeconomic variables, there is little evidence to that effect in Ghana. Can the same conclusion be drawn on Ghana stock exchange?

1.3. RESEARCH PROBLEM:

Despite the fact that, several researches have been conducted by different financial-economists and practitioners on the impact of macroeconomic factors on different stock market, mainly these empirical studies were done in the advanced economies with efficient stock market. (Example in US and Japan Jaffe and Mandelker (1976), Fama and Schwert,(1977)). The conclusions from these early works have revealed that macroeconomic factors have influence on stock price.

Although these empirical conclusions exist, with Ghana stock exchange describe as emerging market in developing economy, could it be that the results from these studies elsewhere be used to conclude certainly that there exist the same relationship between Ghana stock exchange (market) and macroeconomic indicators? Even if so, what is the extent of impact of these macroeconomic variables on Ghana stock index? Thus which macro-variable accounts for what proportion in the stock price change?

There exist very limited studies on Ghana stock exchange to this direction, to empirically find the sort of relationship between macroeconomic factors and stock index to provide answers to these questions.

Due to the limited number studies in this area, it is imperative to make empirical research to find the relationship between Ghana stock index performance and macroeconomic factors.

1.4. OBJECTIVES

The principal objectives of this paper are;

I. Peculiar macro-economic factors in Ghana that affect the Ghana stock index.

II. To find whether there exists long term equilibrium relationship between the Ghana stock market index and Inflation, Interest rates and Exchange rates.

III. The degree to which each selected macroeconomic factor significantly impact on the Ghana stock market index.

IV. The level of response of the stock to each macro-economic variable shock or innovation.

1.5. JUSTIFICATION FOR THE STUDY:

There are number reasons why this research is necessary;

First, since the mid 1970s, a number of studies have suggested that there is a theoretical relationship between asset prices and various economic factors. Empirical investigations have generally supported the conclusions of these authors and it is a fairly well-established finding that asset prices regularly react to fluctuations in macroeconomic variables (see Fama, 1981, 1990; Chen, Roll and Ross, 1986). For example, Chen, Roll and Ross (1986) documented that industrial production, changes in the risk premium, twists in the yield curve, unanticipated inflation and changes in expected inflation are all significantly related to share price changes. However, very few papers have investigated whether such relationship exist using data from Sub Sahara emerging economy like Ghana, which are characterized by unstable macro economic factors. This research seeks to examine whether the theories and empirical results

from advance economies about macroeconomic variables influences on the returns earned on stock markets is valid on Ghana stock market (GSM) in recent time period.

Secondly, it is extremely important to empirically research into how the selected macroeconomic variables significantly relate and impact on the GSE all share index, just as have been done on many developed stock markets. I expect that the result could help investors, public corporate bodies and other market participants such as Ghana government in at least these two areas;

i) investment decision making process

ii) Policy analysis and formulation.

1.6. SCOPE OF THE STUDY:

I intend to employ three macroeconomic variables based on their hypothesized effect on either stock pricing or return on asset. Macroeconomic time series data from 1991 to 2008 of inflation, interest rates, exchange rates and Databank stock index (DSI) data from Databank Group are considered for this study. Databank stock index is use to represent the Ghana stock Exchange returns, the Treasury bill rate as a measure of interest rates and the consumer price index as a measure of inflation. The sample period and the macro-variables for the study are selected due to the year Ghana stock exchange was established and hence data availability reasons.

1.7. LIMITATION OF THE STUDY.

Data Accessibility and associated Cost: My preliminary assessment revealed that though the data set require for this research are available but is not freely accessible.

Quality and reliability of data: The data under consideration for the purpose of this study will be secondary data of macro economic indicators of Ghana's economy reported by the government. One of the major problems is its quality level in terms of accuracy and reliability. Sometimes measurement bias may occur as in the case with many government secondary data. There may be deliberate distortion or changes in the macro economic data for political expediency.

Liquidity and market inefficiency: It is said that the liquidity of the stock is too low and the stock market is inefficient so stock price may not react to the real changes in economic indicators as happens in advance economies which have efficient market. This behaviour of the market may affect the result of this research to the extent that it may not be consistent with results of studies conducted in efficient stock markets.

Measurement validity and availability of large data: An appropriate data measurement for this study is monthly or quarterly data that span for a longer period of time but most of the available data sources such as IFS, Bank of Ghana, etc record the data on annual basis.

1.8. ORGANIZATION

The rest of the paper is organized as follows:

Chapter two gives Literature review about the study. It includes literature of earlier studies on other stock markets and Ghana as well as review of the Ghana's stock exchange performance.

Chapter three entails the methodology applied to achieve the objectives of the study.

The data analysis, findings and discussion are presented in Chapter four. In Chapter five, the Summary, conclusions and recommendations are presented.

CHAPTER TWO

2.0 LITERATURE REVIEW:

2.1.0 SOME EARLY FINANCIAL THEORIES AND RESEARCH ES

A number of empirical evidences have proven the existence of the relationship between the stock market index and various macroeconomic variables, mostly in the advanced financial markets.

One factor model called the CAPM is one of the fundamental financial theories that conceptualize the relationship between macroeconomics factors and stocks returns. Among some of the many early researchers that linked asset returns to macroeconomic factors in CAPM were Treynor (1961, 1962), Sharpe (1964), Lintner (1965) and Mossin (1966),. These researchers independently, built on the earlier work of Harry Markowitz on diversification and modern portfolio theory,(cited in Wikipedia). The CAPM is a model for pricing an individual security or a portfolio. The CAPM gives the asset the expected required return or discount rate, i.e. the rate at which future cash flows produced by the asset should be discounted given that asset's relative riskiness.

However, CAPM was seen as so simplistic and for that reason was criticized by Ross (1976) and Roll (1977) arguing that there must be more than one dimension to asset pricing. In its place, Ross and Roll (1980) proposed a multi-factor model which they called the arbitrage pricing theory (the APT) which included several macro-economic explanatory variables such as growth in industrial production , change in expected inflation, unexpected inflation, unexpected changes in risk premiums, unexpected changes in term structure slope etc.

Accordingly, Flannery and Protopapadakis (1999) stated that "macro economic variables are the natural common risk factors underlying security returns in multifactor asset pricing models. Macro economic factors should affect investment project risks, estimates of firm's current and future cash flows, and market risk premium. Therefore, macroeconomic factors should partly account for aggregate equity price changes".

Another way in which stock price P is related to macroeconomic variables is the dividend-ratio model $\frac{D}{P} = r - g$, by Gordon (1962), which was derived under the assumption that dividends D will grow at a constant rate g forever, and that the discount rate r will never change. In order to fill a significant gap in the Gordon model that r will never change, some research work that permitted an analysis of the variation, through time, in the stock price in relation to changes in discount rates and dividend growth rates were done.

Keim and Stambaugh (1986), and Fama and French (1988, 1989) found that discount rates could change over time to affect the present value of cash flows. When this happens it could affect the price of stocks. Campbell and Shilla (1988) in their study to identify what accounts for the variation, through time, in the dividend-price ratio on corporate stocks found that the discount rate could not remain constant throughout time and that when discount rates are high, the dividend-price ratio is expected to be high. Thus changes in the discount rate over time results changes in the dividend-price. Hence changes in discount rate over time affect stock prices.

Fama (1990) used growth rates of production to proxy for shocks to expected cash flows and identified that this accounts for 43% of the total return variance of annual NYSE returns, using sample data of 1953-1987. He also asserted that expected returns on asset vary through time because the discount rates that price expected cash flows changes with time. In his study,

he stated that the standard valuation models posit three sources of variation in stock returns: (a) shocks to expected cash flows, (b) predictable return variation due to variation through time in the discount rates that price expected cash flows, and (c) shocks to discount rates.

Earlier on many studies had examined the impact macro economic factors stocks return variation. Fama (1981) and Kaul (1987) indicated that real activity explains more return variation in annual NYSE value-weighted return for longer return horizons.

Geske and Roll (1983) in their research paper found that large fractions (often more than 50%) of annual stock-return variances can be traced to forecasts of variables such as real GNP, industrial production, and investment since they are important determinants of the cash flows to firms.

French, Schwert, and Stambaugh (1987) found that part of the variation in stock returns can be traced to a "discount-rate effect," that is, shocks to expected returns thus discount rates generate opposite shocks to prices. According to Reilly and Brown (2005) "the discounted cash flow methods of the dividend valuation model measure how successful (or not) the investment has proved itself to be by the application of discount rate as the cost of equity.

Fama and Schwert, (1977) estimated the extent to which various assets were hedged against the expected and unexpected components of the inflation rate during the 1953–1971 periods. Their findings indicated that U.S. government bonds and bills were a complete hedge against expected inflation whiles the common stock returns were negatively related to the expected component of the inflation rate, and also to the unexpected component. Contrary to a commonly held belief among economists, Bodie, (1976) using annual, quarterly and monthly data for the twenty year period 1953 to 1972 and regression analysis, obtained a result that indicated real return on equity is negatively related to both anticipated and unanticipated inflation, at least in the short run, This negative correlation led to a surprising and somewhat

disturbing conclusion that to use common stocks as a hedge against inflation one must sell them short.

Also Jaffe and Mandelker, (1976), conducted an empirical investigation into the relationship between inflation and the returns on New York stock market. They found a negative relationship between unanticipated inflation and the returns to common stock, a result consistent with previous theoretical works. Summers (1981), revealed that unexpected high inflation might lead to more restrictive polices, which in turn could lead to reduction cash flows for firms and lower stock prices. Feldstein (1980, 1981), found that share prices failed to increase during the years of substantial inflation in U.S. Indeed, in his findings share value per dollar of pretax earnings actually fell from 10.82 in 1967 to 6.65 in 1976 which indicates an inverse relation between higher inflation and lower share prices.

Pearce and Roley, (1983) researched into the impact of money supply on stock prices. They asserted that stock prices respond only to the unanticipated change in the money supply as predicted by the efficient markets hypothesis. They further argued that an unanticipated increase in the announced money supply depresses stock prices while an unanticipated decrease elevates stock prices. They also added that the stock price responds to money supply in short run; and the stock price response is essentially complete early in the subsequent trading day.

Chen and Ross(1986) notably represented industrial production, changes in risk premium, twists in the yield curve, unanticipated inflation and changes in expected inflation as systematic influences on stock market returns and a examined their influence on asset pricing.

They found out that several of these economic variables significantly explained expected returns. Modigliani and Cohn (1979) argued that investors incorrectly use inflation-swelled nominal interest rates to capitalize or discount corporate earnings.

Darrat and Mukherjee (1987) use a Vector Autoregression (VAR) model along with Akaike's final prediction-error on the Indian data over 1948-84, and show that a significant causal relationship exists between stock returns and certain macroeconomic variables.

Also, Cutler, Poterba, and Summers (1989) concluded in their empirical investigation that industrial production growth was significantly positively correlated with real stock returns over the period 1926-1986, but not in the 1946-1985 sub periods. Brown and Otsuki, (1990) find that money supply, production index, crude oil price, exchange rate, call money rate and a residual market error are associated with risk premia and affect the Japanese stock market. Lee (1992) investigates the causal relationship and dynamic interaction among asset return, interest rates, real activity and inflation, using a multivariate VAR model with postwar U.S. data. He indicated that these macroeconomic factors Granger-causes real stock returns.

With regard to application of cointegration method to analyze econometric variables, several researchers have applied it specifically to study the relationship between macroeconomic factors and stock index.

Mukherjee and Naka (1995) tested the dynamic relationship between six macroeconomic variables and the Japanese stock market, by employing a vector error correction to a model of seven equations. They find that a long-term equilibrium relationship exists between the Japanese stock market and the six macroeconomic variables such as exchange rate, money supply, inflation, industrial production, long-term government bond rate and call money rate.

Hondroyiannis and Papapetrou,(2001) used Johansen and Juselius cointegration method to study the dynamic interactions among indicators of economic activity, such as industrial production, interest rate and exchange rate, the performance of the foreign stock market, oil prices, and stock returns to examine whether economic activity movements affect the performance of the stock market for Greece. Their empirical evidence suggests that stock returns do not lead changes in real economic activity while the macroeconomic activity and foreign stock market changes explain only partially stock market movements. Oil price changes explain stock price movements and have a negative impact on macroeconomic activity.

Mayasami and Koh, (2000), applied Johansen vector error-correction model to investigate the dynamic relations between macroeconomic variables and Singapore stock market and found that Singapore stock market was sensitive to interest rate and exchange rate changes. Binder and Merges (2001) tested four economic variables to explain the behavior of stock market volatility: uncertainty about the price level; the riskless rate of interest; the risk premium on equity; and the ratio of expected profits to expected revenues. They found that the set of four economic variables had significant explanatory power and accounted for a high variation in market volatility from 1929 to 1989. Li,(2002) empirical analysis generally confirms that interest and inflation affect both stock and bond prices some degree. Among the macroeconomic factors he considered, uncertainty about long-term expected inflation played a dominant role in affecting the major trends of how stock and bond returns co-move. The effect of unexpected inflation and the real interest rate is significant to a lesser degree.

A research by Altay, (2003) tested the effect of economic factors on asset returns in German and Turkish Stock Market using an APT model. He found some evidence of the unexpected interest rate factor beta coefficients and the unexpected inflation factor beta coefficients had

significant effects on asset returns of the German Stock Market. But he did not find any unexpected macroeconomic factor had a significant influence on asset returns in the Turkish Stock Market. Adel (2004) applied the vector error correction model (VECM) by Johansen (1991) to determine the impact of selected macroeconomic variables on Amman Stock Exchange (ASE) in Jordan. The macroeconomic variables used were the real economic activity, money supply, inflation, and interest rate. The empirical result revealed that the stock prices and macroeconomics variables have a long-term equilibrium relationship.

Maysami ,Howe and Hamzah (2004) also applied cointegration method to examined the long-term equilibrium relationships between some selected macroeconomic variables and the Singapore stock market index (STI), as well as with various Singapore Exchange Sector indices—the finance index, the

property index, and the hotel index. Their study concluded that the Singapore's stock market and the property index form cointegration relationship with changes in the short and long-term interest rates, industrial production, price levels, exchange rate and money supply.

Joshep and Vezos (2006) asserted that Foreign exchange rate and interest rate risks are important financial and economic factors affecting the value of common stocks.

Humpe and Macmillan,(2007) applied cointegration analysis to examined whether a number of macroeconomic variables influence stock prices in the US and Japan in long term. The macroeconomic variables they considered in the model were industrial production, the consumer price index, money supply, long term interest rates. For the US, they found that the stock prices were positively related to industrial production and negatively related to both the consumer price index and a long term interest rate. They also found that there existed an insignificant (although positive) relationship between US stock prices and the money supply.

However, for the Japanese data they found two cointegration vectors. They found for one vector that stock prices are influenced positively by industrial production and negatively by the money supply. For the second cointegration vector, they found industrial production to be negatively influenced by the consumer price index and a long term interest rate. They concluded that the contrasting results may be due to the slump in the Japanese economy during the 1990s and consequent liquidity trap. Gay (2008) investigated the time-series relationship between stock market index prices and the macroeconomic variables of exchange rate and oil price for Brazil, Russia, India, and China (BRIC) between 1999 and 2006 using the Box-Jenkins ARIMA model. He found no significant relationship between respective exchange rate and oil price on the stock market index prices of either BRIC country. He said this may be due to the influence other domestic and international macroeconomic factors on stock market returns, warranting further research.

In Ghana Adjasi, Harvey and Agyapong, (2008) studied the relationship between Ghana Stock Market and Foreign Exchange market, and determined whether movements in exchange rates have an effect on stock market in Ghana. It was found that there is negative relationship between exchange rate volatility and stock market returns – a depreciation in the local currency leads to an increase in stock market returns in the long run. Where as in the short run it reduces stock market returns. Additionally, they also found that the consumer price index has a strong relationship with stock market volatility. This means that an increase in consumer price would lead to a rise in stock market volatility. Adjasi and Biekpe, (2005) investigated the relationship between stock market returns and exchange rate movements in seven African countries. Cointegration tests showed that in the long-run exchange rate depreciation leads to increases in stock market prices in some of the countries, and in the short-run, exchange rate

depreciations reduce stock market returns. Ologunde, Elumilade and Asaolu (2006) examined the relationships between stock market capitalization rate and interest rate in Nigeria using regression. Their results showed that the interest rate exerted positive influence on stock market capitalization rate. Mohiuddin, Alam and Shahid, (2008) investigated the explanatory power of various macro-factors such as inflation rate, exchange rate, interest rate, money supply and production index on the variability of the stock price in Bangladesh by using multiple regression analysis. However, their findings indicated no significant relationship has been found between the stock price and any of the macroeconomic factors.

Adam and Tweneboah, (2008) applied multivariate cointegration through error correction model to examine the impact of Foreign Direct Investment (FDI) on the stock market development in Ghana. Their results indicated that there exists a long-run relationship between FDI, nominal exchange rate and stock market development in Ghana. They concluded that a shock to FDI significantly influence the development of stock market in Ghana. They also employed cointegration test and vector error correction models (VECM) to examine both long-run and short-run dynamic relationships between the stock market index and the economic variables. Their paper established that there is cointegration between macroeconomic variable and Stock prices in Ghana. The VECM analysis shows that the lagged values of interest rate and inflation have a significant influence on the stock market. Quartey and Gaddah, (2007) investigated how macro-economic factors affect Stock Market development in Ghana using the Johansen's cointegration procedure using Quarterly data from 1991 to 2004 . They found that exchange rate and Treasury bill had significant impact on long run development of the Ghana Stock exchange, but inflation did not prove to be a significant factor in predicting the long run development of the stock market. Further more, Kyereboah-

Coleman and Agyire-Tettey, K. F.(2008) examined the effect of macroeconomic indicators on the performance of Ghana stock markets covering the period 1991-2005. The findings of their study revealed that lending rates from deposit money banks and inflation rate had an adverse effect on stock market performance and particularly served as major hindrance to business growth in Ghana but investors benefited from exchange-rate losses as a result of domestic currency depreciation. Twerefou D.K. and Nimo M. K. (2005), found that investors in Ghana considered three main macroeconomic risk factors — short-term interest rate risk, inflation risk and the term structure of the country's interest rate in the determination of the various industrial asset prices during the period from 1997 to 2002.

Samitas and Kenourgios, (2007) investigated Macroeconomic factors' influence on European countries stock returns by the application of cointegration and causality test. According to their findings, it was proved that American macroeconomic factors thus economic activity has a significant influence on "old" European stock markets in the long run but was surprisingly less influential than domestic economic activity in "new" European stock markets. Lorie & Hamilton (1973), Poole(1975), Reilly (1989), Thorbecke (1997) and Rapach (2001); cited in Chung, 2005) found convincing and overwhelming evidence that changes in the rate of money supply growth leads to changes in equity prices. Friedman and Schwart (1963) hypothesized that when the Federal Reserve Bank buys or sells bonds to adjust bank reserves and eventually the money supply (M2), the immediate shock is on government bonds, followed by corporate bond prices and common stock prices.

2.2.0 STOCK EXCHANGE

Stock Exchange is organized market for buying and selling financial instruments known as securities, which include stocks, bonds, options and futures. Most stock exchanges have specific locations where the trades are completed. For the stock of a company to be traded at

these exchanges, it must be listed, and to be listed, the company must satisfy certain requirements.

2.3 .0.THE GHANA STOCK EXCHANGE:

(GSE) is the principal stock exchange of Ghana. The exchange was incorporated in July 1989 as a private company under the Ghana companies' code, 1963(Act179) with trading commencing in 1990. However, the status of the company was changed to a public company under the company's Code in April 1994.The exchange was given recognition as an authorized stock exchange under the stock Exchange Act of 1971. It currently has around 34 listed companies and 2 corporate bonds as at the end of 2008. All types of securities can be listed. Criteria for listing include capital adequacy, profitability, spread of shares, years of existence and management efficiency. The GSE is located in Accra.

Since its inception, the GSE's performance has varied considerably. All listings are included in the main index, the GSE All-Share Index. The GSE All-Share Index measures stock performance on the Ghana Stock Exchange. In 1993, the GSE was the 6th best index performing emerging stock market, with a capital appreciation of 116%. In 1994 it was the best index performing stock market among all the emerging markets, gaining 124.3% in its index level. 1995's index growth was a disappointing 6.3%, partly because of high inflation (59.56%) and interest rates. Growth of the Index for 1997 was 42%, and at the end of 1998 it was 868.35 (See 1998 Review for more information). In 2003 the exchange had an outstanding performance which became the best performing market in Africa. At the end of 2004, market capitalization stood at US$ 2,644 million. Annual turnover ratio just remains about 3.2% in 2004. As of October 2006 the market capitalization of the Ghana Stock

Exchange was about ($11.5bil) 111,500bil cedis. As at December 31 2007, the GSE's market capitalization was 131,633.22bil cedis. In 2007 the index appreciated by 31.84%. (See "Publications" section on GSE's site for more information & From Wikipedia, the free encyclopedia).

The number of listed companies increased to 13 in 1991; 19 in 1995 and currently stands at 32. The interest rates dropped from 40.95% by the end of 2001 to 9.95% by the end of 2006, the cedi /dollar deprecation decreased from 104.4% in 1999 to 2.0% in 2006.

Listed companies on the exchange have tripled from 11 to 34 in 2008. The GSE All-share Index moved up from 6,718.88 points at the beginning of January 2008 to gained 18.92% at the end first quarter at 7,848.14 points and then 10,346.30 in June, 2008 representing a half year gain of 56.77% compared with a gain of 5.76% for the same period in 2007. Thus the market performed better than other investments such as treasury bills (11.10%p.a), fixed deposits and the appreciation of the major international currencies against the cedi. (US$ - 0.77%, £ - 1.60%, € - 8.52%) as of the end of March 2008. The gain in the index, even at the half-year rate, was above the prevailing annual interest equivalent on 91- day treasury bills of 16.3% at the end of June, 2008. The index gain was also above the June 2008, twelve months inflation rate of 18.41% as well as the 31.84% index gain recorded for the whole of the year 2007.

Market capitalization rose from GH¢12,513.05million at the beginning of January 2008 to GH¢15,587.76million at the close of June 2008, an increase of GH¢3,074.71 billion or 24.6%. The increase was mainly due to increases in share prices of most of the listed companies. The volume of shares traded during the 124 trading sessions for the period was 189.08million

valued at GH¢196.53million as against 135.85million shares valued at GH¢78.61million for the first half of 2007. These represent increases of 36% (volume) and 150% (value) of shares traded over the first half of 2007. The major contributor to the volume and value increases was SIC Insurance Co. Ltd (SIC) which contributed about 33.73% and 59.80% of total volume and value respectively.

Out of the 34 listed equities, nine companies recorded above 50% growth in share prices and seven recorded above 10%, whiles three recorded gains above 5%. Of the thirty-four listed equities, seven companies recorded some lose in their share prices while eight maintained their prices. With the GSE automation project yet to be completed, it is expected that there will be increased trade volumes, better price recovery and transparency in the market. All these are expected to deepen the market and impact positively on its performance. With the economic expectations revealed in the 2008 national budget, as well as the unrealized adverse effect of high rise in crude oil on stock markets worldwide, some analysts believe that the Exchange's performance in the second quarter is one of the best among emerging markets if not worldwide. (See, GSE 1st QUARTER & HALF YEAR REVIEW, 2008). Currently plans are far advanced to trade introduce commodity trading on the exchange.

2.4.0 INFLATION:

Inflation is also one of the most popular economic factors influencing stock prices.

In economics, inflation is a rise in the general level of prices of goods and services in an economy over a period of time. The term "inflation" also refers to a measured rise in a broad price index that represents the overall level of prices in goods and services in the economy. Inflation can also be described as a decline in the real value of money—a loss of purchasing

power in the medium of exchange which is also the monetary unit of account. A chief measure of price inflation is the inflation rate, which is the percentage change in a price index over time.

As part of the effects of inflation, an increase in the general level of prices implies a decrease in the purchasing power of the currency. That is, when the general level of prices rises, each monetary unit buys fewer goods and services. High or unpredictable inflation rates are regarded as harmful to an overall economy. They add inefficiencies in the market, and make it difficult for companies to budget or plan long-term. Inflation can act as a drag on productivity as companies are forced to shift resources away from products and services in order to focus on profit and losses from currency inflation. Uncertainty about the future purchasing power of money discourages investment and saving. And inflation can impose hidden tax increases, as inflated earnings push taxpayers into higher income tax rates. (Wikipedia)

2.4.1INFLATION AND STOCKS

There is extensive empirical literature on the relationship between inflation and common stocks, as whether common stocks are inflation hedges, but the evidences have been mixed to say the least.

For many years economist thought that stocks ought to be inflation-neutral investment. They believed, and many of them still believe, that changes in the rate of inflation, whether expected or unexpected, ought to have no effect on the expected real return on stocks. This is known as Fisherian (1973) assumption. The Fisherian assumption is that real rates of return are independent of inflationary expectations. According to Fisher (1930) asset values should

be positively related with expected inflation, providing a hedge against rising prices. If the implied positive relationship between stock prices and inflation does not hold, stock investors will be vulnerable to inflation, especially during rising economic cycles. Reuben (1956) reported that shares of net debtor firms rose in price as a result of inflation, whiles those of net creditors declined. Thus inflation caused wealth redistribution.

Contrary to this view, recent empirical researches seem to indicate that real rates of return are negatively correlated with inflation. In investigation the impact of inflation on common stocks returns both Lorie & Hamilton, (1973) and Gultekin,(1983) found that greater inflation leads to a lower level of returns on common stocks. Lintner, (1973) also reported that real rate of return on common stock in U.S were negatively correlated with both anticipated and unanticipated inflation, at least in the short run. Their finding is a direct contrast to the views of Fisher that inflation is advantageous to stock holders, because it reduces the burden on corporations to service and repay their debt. Cagan,(1974) indicated that stock prices sometimes reflected inflation over long periods of time, but over short periods, they frequently failed to stay even with inflation.

Fama (September 1981) revealed that economic "shocks" such as oil price hikes can cause a simultaneous increase inflation rate and decline of expected real earnings, resulting in a negative correlation between inflation and real stock returns. Moreover, Feldstein, (1978,1980) reported that higher inflation results in lower real dividends because the tax system results in lower after- tax real earnings as the inflation rate rises. Nelson, (1976) claimed that inflation has seriously depressed stockholders' returns because of its effect on corporate taxation.' The ostensible explanation is that corporations are taxed on reported,

rather than adjusted, profits. As taxes rise with inflating reported profits, the effective tax rate on real profits also rises. There is also the view that many investors in the stock market suffer from a form of "money illusion". Investors mistake the rise in nominal rate of interest for a rise in the real rate. As a result, they undervalue stocks in a period of higher inflation. Bodie, Kane and Marcus, (1999 , 4th edition). They tend to capitalize equity earnings at a rate that follows the nominal rate, whereas (as has long been known to students of finance) the economically sound procedure is to capitalize them at the real rate. That is, at the nominal rate less that portion of it representing the inflation premium. (Cohn and Modigliani,1979)

Yartey and Adjasi (2007), claimed that a stable macroeconomic environment is crucial for the development of the stock market. Macroeconomic volatility worsens the problem of informational asymmetries and becomes a source of vulnerability to the financial system. Low and predictable rates of inflation are more likely to contribute to stock market development and economic growth. Both domestic and foreign investors will be unwilling to invest in the stock market where there are expectations of high inflation.

Adrangi, et al, (1999), stated that equities in industrialized economies failed to maintain their value during periods of high inflation. For example, during the rapid inflation years of the 1970s, U.S. stocks prices did not keep pace with general price levels. In their investigation of the relationship between Inflation, output and stock prices from two major emerging markets namely Korea and Mexico by applying Johansen and Juselius cointegration tests, they reported a negative relationship between the real stock returns and unexpected inflation after purging inflation of the effects of the real economic activity. The Johansen and Juselius cointegration tests revealed the existence of weak long-run equilibrium between stock prices

and general price levels. However, in both economies, stock prices and general price levels showed a strong long-run equilibrium with the real economic activity.

Sharpe (2000) examined the effect of inflation on stock valuations and expected long-run returns. The study indicated a negative relation between equity valuations and expected inflation. He found two effects: a rise in expected inflation coincided with both (i) lower expected real earnings growth and (ii) higher required real returns. Surprisingly, the earnings channel mostly reflected a negative relation between expected inflation and expected long-term earnings growth. His findings also showed that the effect of expected inflation on required (long-run) real stock returns was also substantial. A one percentage point increase in expected inflation was estimated to rise required real stock returns about one percentage point, which on average would imply a 20 percent decline in stock prices. But the inflation factor in expected real stock returns was also in long-term Treasury yields; consequently, expected inflation had little effect on the long-run equity premium.

In addition to the aforementioned research works, Nelson (1976) have presented evidence that monthly returns of a broad group of New York Stock Exchange common stocks are negatively related with both the expected and unexpected components of the Consumer Price Index (CPI) from 1952 to 1981.

2.5.0 INTEREST RATE

There are plenty of variables that affect stock market all over the world, but stock markets are heavily hit by the ones which are most fundamental to value (stock prices). One such as them is interest rate which plays an important role in affecting the stock market. It determines what other investment instruments might be. Naturally, investors will select an investment with

return high enough to compensate for the lost opportunity of earning interest from guaranteed Cash Deposit (CD) or Treasury bill, offered by banks, for taking on additional risk. If a bank is paying as high as ten per cent in interest for cash deposit annually than common stock's return, lots of people will prefer to deposit their money in that bank than invest in the stocks, as such, not many buying and selling activities will take place in the stock market. This is especially true during economic downturn or recession. During economic crisis, return on T-bill can increase to seven to ten per cent. During that time, almost everyone preferred to buy T-bill than investing in the stock market.

In view of this, businesses need to consider the discount rate when deciding whether to spend some of their profits on new investment such as buying piece of equipment, or whether to give the profit back to their shareholders. In an ideal world, they would only make new investment if the shareholders would get a bigger profit later. The amount of extra profit that a shareholder requires in the future in order to prefer that the company for example buying new equipment rather than giving them the profit now is based on the shareholder's discount rate. Businesses normally apply discount rate to their decisions about making new investment, by calculating the net present value of the decision.

From another perspective, interest rate affects the operations of companies too. If a company borrows money from a bank at higher rate, the high interest rate will raise the company's cost of doing business which may eat up into its profits thereby reducing dividend. Moreover, if interest rate rises to a level where the company has problems paying off its debt, especially when it is highly geared, then the company's survival may be in jeopardy. In that case,

investors will demand an even higher risk premium. As a result, the fair value of the stock will fall even further.

Denzil, Watson and Head, (2007), stated that interest rate volatility makes planning of future cash flow more difficult. They emphasized that significantly increased interest payments increase financial risk and hence bankruptcy. A fall in interest rate reduces the cost of capital due to decreasing financial risk, which increase portfolio of attractive projects in the future. High interest rates normally go hand in hand with a sluggish economy. They prevent consumers from buying new cars and houses.

Won, Khan,Du, (2005), examined the long-term and short-term equilibrium relationship between major stock indexes and interest rate of Singapore and United States by employing advanced time series analysis techniques that included cointegration, Johansen multivariate cointegration and Granger causality method. The cointegration results based on data covering the period January 1982 to December 2002 suggested Singapore's stock prices generally exhibited long-run equilibrium relationship with interest rate but a similar relationship did not hold for the United States. Foreman (2007), published that a stock's price is based on two primary factors. One is the value of its assets. He further emphasized that to figure out how much to invest in a stock today to receive a specific amount in the future, the future value is discounted at the going market interest rate.

A stock is worth the present value of some stream of cash flows that it will produce in the future. The stock value is calculated by projecting out future free cash flows and discounting them back to present. The key variables, therefore, are the future free cash flow and the discount rate used in the calculation.

Andy (2009) asserted that from 1964 to 1981, the United State stock market went exactly nowhere. He claimed that in aggregate, no money was made by investors during this period. He attributed this to the fact that interest rates rose dramatically. The rate on long-term government bonds went from a mere 4.2% in 1964 to 13.65% as the 1980s began. This had a devastating effect on stock prices. However from 1981-1998 stocks rose more than tenfold. This was due to the remarkable drop in interest rates – all the way from that 13.65% in 1981 to next to nothing at the start of this decade. In his analysis he stated that investors buy stocks to receive "coupons" that take the form of cash flows or earnings per share. Thus, if market rates increase, the present value of those future cash flows decline and larger cash flows will be needed to justify the current stock price.

2.5.1 ECONOMIC VARIABLES, CORPORATE PROFIT AND STOCK INDEX

Apart from studies that link the stock index directly to macro economic factors, there are some literatures that link the impact of the macro variables on stock price through corporate earnings and such corporate profit. O'Brien (1994, cited in Chung, 2005) examined the relations between corporate earnings and shocks in industrial production, inflation, interest rates and stock returns, and found that corporate earnings are sensitive to industrial production and inflation shocks, and declared that the direction of growth in corporate earnings can affect stock prices directly.

Oxelheim and Wihlborg (2003) suggested that a company earning is vulnerable to changes in macroeconomic forces. He sited that some the forces are the relative prices of these three categories;-exchange rates, interest rates, and inflation rates. Chung, (2005), suggested among

other that; level of disposable income, interest rates, inflation rates, value of the dollar in world markets, price fluctuations, monetary policies, affect companies' value through their impact on earnings. Pandey, (1999), also asserted that during high inflationary period the real value of dividends erode hence companies with falling or constant profits may not be able protect the real value shareholders return.

2.5.2 EXCHANGE RATE AND STOCK PERFORMANCE:

Bahmani-Oskooee (1992) is among the first to use cointegration and Granger causality to explain direction of movement between exchange rate and stock prices. Abdalla and Murinde (1997) finds out that for India, Korea and Pakistan, exchange rate Granger cause stock prices. Makurjee and Naka (1995) and Ajay and Mougouge (1996) show that stock market prices are cointegrated with exchange rates in eight industrial economies. Koutoulas and Kryzanowski (1996) revealed that stock market volatility significantly responds to exchange rate volatility in Canada. Kearney (1988) discovers similar results for Ireland.

CHAPTER THREE

3.0 RESEARCH DESIGN AND METHODOLOGY

3.1.0 INTRODUCTION:

This chapter outlines the various approaches the researcher intends to apply to achieve the objectives set out for the project. It presents the design of the research, the source of the data , the theory of the method, cointegration analysis, the researcher intend to use to identify the relationship between the selected variables.

3.1.1 RESEARCH DESIGN

Since this study is aimed at modeling the relationship between the Ghana stock exchange index and the selected macro-economic variables, quantitative data will be used. The researcher, specifically intend to use times series data to identify the impact of each variable on the performance of the Ghana stock each since it inception. The quantitative time series data will be analyzed by Johansen cointegration method through vector error correction model (VECM). However, before the Johansen Cointegration test will be done, an initial analysis that involve test of stationarity and information criterion will be conducted.

The purpose of the stationarity test is to detect the nature of the distribution of the times series data, whiles the information criterion test is to find an optimum number of the parameters or past values of the time series variables which is rich information to identify the model.

Moreover, an impulse response and variance decomposition analysis of the data will be conducted to ascertain the impact of each variable on one another.

The statistical software that is considered for the data analysis is Gretl and EasyReg International.

The key reason for doing quantitative research was informed by interest to investigate the

relation between the variables and their impact on the Ghana stock exchange index. The use of this type of data will give a descriptive (summary) statistics and also help to test hypothesis about the significance of the relation that will be identified.

Further reasons for choice of this kind of data are discussed below; however I firstly explain what a secondary data is.

The term "secondary data" refers to data that were collected for other studies. For the first researcher they are primary data, but for the second researcher, they are secondary data. Secondary data are gathered and recorded by someone else prior to (and for purposes other than) the current project. Secondary data are usually historical data and already assemble. Secondary data both include raw and summaries. According to Saunders et al (2007) secondary data are used for explanatory research.

Time series of a data are obtained as a result of data that has been compiled about a variable over a number of different times.

3.1.2 JUSTIFICATION OF USING SECONDARY DATA

My choice of secondary data was based on the following reasons;

- Consistency of the data with my research needs. The study objectives require historical data so that the responses of the stock index to macro variables shocks and their contribution to the variation in stock price can be explored and analyzed.
- The timescale of my research is relatively short term. According to Saunders et al (2007) "One solution of longitudinal studies in a short time frame is to use secondary data."
- Looking at my research which seeks to study the long run and short run relationship between the selected variables, it would be more appropriate to apply secondary time

series data that span long period of time, so that any relation that will be identify will be robust and reliable.

- Cost factor: It is less expensive than gathering the data all over again. Given my limited resources, secondary data will provide the only feasible data sources. This will allow for larger scale studies on a small budget.
- The secondary data was already assembled and partially summarized. An important additional benefit is the format in which data were prepared. The data were already computer-readable form, specifically in excel format which could be easily uploaded in many statistical software.
- Accessibility: It was not difficult in obtaining the secondary from their respective sources; IFS and databank.

3.1.3 Sampling method

For the purpose of this research, Non-probability sampling method was adopted, The number of observations for all the variables were selected base on the number of available observations since trading started on GSE and the central limit theorem. As mentioned in chapter 2 the first trading of the GSE started in 1990. Considering the period between 1990 and 2007, the set of monthly observations recorded by DSI is about 206. Transformation of this data set into quarterly data would give just a total sample size of about 51

According to Henry,(1990) cited in Saunder, etal (2007), advises against probability sampling for population less than 50 cases.

In this study, my sample frame is the total list or set of quarterly observations for the period 1990:1 to 2009:1. The sample frame is complete list of all the cases in the population from which sample is drawn. The sample used covers the period between 1994:1 and 2007:4

3.1.4 DATA SOURCE EVALUATION

The intended data for this study is a secondary time series data from Databank Stock Index (DSI) which represent GSE index, Treasury bill rate (TB) as interest rate and consumer price index (CPI) as level of inflation . The macro economic variables were obtained from IFS statistics website while the Databank Stock Index (DSI) was collected from Databank Group Research. The Databank Stock Index (DSI) variable represents the GSE market performance. It is the first ever index computed by Databank Group. In order to ensure that the result of the studies become valid and reliable. The researcher took into consideration the reputation and the credibility of these institutions that published the data by searching about their background and profile. My initial examination of the webpage to assess the data's overall suitability revealed that the data source; IFS and Data Bank group have credibility, having been compiled for and supported by World Bank. I also discovered that the actual data collected were governed by a series of World Bank standards and regulation therefore data biasness and inaccuracies were not likely.

In Ghana there are two main acclaimed sources of Ghana stock index. These are the GSE All-Share Index and Databank Stock Index (DSI). It was until 1994 that the GSE came out with its own index.

Databank was incorporated in 1990; it focuses on research and the compilation and collation of research data for the financial sector and the development of the capital market in particular.

When the Ghana Stock Exchange (GSE) started operations in 1990, Databank was the first compute the stock's indices - the Databank Stock Index (DSI) and the Databank Stock Average (DSA) – used in measuring the performance of the stock market.– the GSE All-Share Index.

Databank research produces the most consistent and comprehensive research on Ghana's macroeconomic environment, budget, stock market and listed companies. Fund Managers and institutional investors, both home and abroad, rely on the incisive and analytical reports produced by Databank Research.

In addition, Databank Research provides regular and reliable information on financial markets to leading media houses (radio, television, and print media) including internationally acclaimed ones such as BBC, CNN, Financial Times and Bloomberg. They also provide regular economic briefing services for local blue chip companies.

The Databank Africa Desk gives a comprehensive review of African markets and economies. In 2007, Databank Research competed with international heavyweights such as Deutche Bank, UBS, Citigroup, EFG Hermes and African Alliance for the enviable award of the "Best Africa Research Team" at the Ai Index Awards held at the London Stock Exchange and organized by African Investor. Databank Research towered above the other competing firms as it took home the diadem as the Best Africa Research Team, 2007.(see; http://www.databankgroup.com/index)

3.1.5 Data Description and Time Frame

The data for the study are quarterly from 1994.1 to 2007.4. The selection of these variables over this period is based on data availability and applicability. All the time series of economic and financial data are considered non- stationary at their levels. The data collected were changed into quarterly and transformed into natural logs. The logarithmic transformation often removes enough skewness to allow least squares models to produce unbiased results (Chung, 2005). Logarithm helps to convert changes in nonlinear variables into percentage changes, and many relationships are naturally expressed in terms of percentages as many

small changes in logarithms can be interpreted as proportional or percentage changes in variable.(see stock and Watson,2007 page 267).

3.1.6 Dummy Inclusion.

Dummy variables are variables included in the model to address the problem of seasonal changes in the variables. Dummy Values of 0 and 1 are assigned represented on the data if there is any seasonality, if not is given a zero value.

3.1.7 DATA DESCRIPTION AND SOURCE

TALE 1.0:

VARIABLES	CONCEPT	DESCRIPTION	UNITS	SOURCE
LNDSI	Log of Databank Stock Index	Databank stock Index	30 Nov. 1990= 79.83	Databank Group Research
LNCPI	Log of inflation	Consumer Price Index	Percentage Per annum (200=100)	IFS statistics
LNTB	Log of Interest rate	91-day Treasury bill rate	Percentage per Annum	IFS statistics
S1, S2, S3		Dummies for seasonal changes	(0,1)	Databank Group Research
LNEX	Log of Exchange reate	Cedis /$	Cedis	IFS

3.1.8 MODEL SPECIFICATION

I postulate the relationship between stock prices and the selected macro economic variables as

$$LDSI = B_0 + B_1 LNTB + B_2 LNCPI + LNEX + s + \varepsilon_t;$$

Where LNDSI is log of databank stock index, LNCPI is log of consumer price index, LNXB is log of 91-day treasury -bill rate, LNEX is log of Exchange rate and S is seasonal dummy variable.

B_1 and B_2 are the sensitivity of each of macro-economic variables to stock prices. B_0 is a constant and ε_t is error correction term. The coefficients of LNCPI, LNTB and LNEX are expected to be negative. The model specification above was based on economic theory, intuition, judgment, and empirical discussion.

3.2.0 THEORITICAL WORK

The twin concepts of cointegration and error correction have drawn a good deal of attention in macro econometrics over recent years. The attraction of the Vector Error Correction Model (VECM) is that it allows the researcher to embed a representation of economic equilibrium relationships within a relatively rich time-series specification.

The basic idea behind cointegration is that if all the components of a vector time series process Z_t have a unit root, or in other words, if Z_t is a multivariate with integration order one I(1) process, there may exist linear combinations $\beta' Z_t$ without a unit root. These linear combinations may then be interpreted as long term relations between the components of Z_t, or in economic terms as equilibrium relations. Certain macroeconomic time series variables exhibit long run equilibrium relationships usually because the economic forces that act in response to deviations from initial equilibrium may take a long time to restore equilibrium.

Graphically, parallel shape of the plots of the macroeconomic variables time series involved can be used to suspect cointegration.

In order to avoid the threat of spurious regression associated with non-stationary data, the traditional approach used by early researchers was to take first differences of all the variables before proceeding to apply ordinary regression analysis. But this can result in the loss of important information. Thus the need apply Johansen cointegration method to over come this weakness. The argument is that while the variables in question are I(1) when taken individually, there exists a linear combination of the variables that is stationary without differencing, or I(0).

That is, while the ensemble of variables may be "free to wander" over time, nonetheless the variables are "tied together" in certain ways. And it may be possible to interpret these ties, or cointegrating vectors, as representing equilibrium conditions.

For this study I make use of the Johansen (1991, 1995) maximum likelihood procedure to investigate the long run relationship between the selected variables, which is based on a vector error correction model (VECM) . Johansen's multivariate approach has number of advantages; testing and estimating multiple long-run equilibrium relationships is possible. Also, Johansen's estimation method allows for testing of various economic hypotheses via linear restrictions in the cointegration space (see Johansen and Juselius, 1990, Anokye and Tweneboah (2008).

3.2.1 COINTEGRATION AND VECTOR ERROR CORRECTION MODELS (VECM)

The vector error correction models (vecm) is given by;

$$\Delta yt = u_t + \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-1} + \varepsilon_t \text{.....(1)},$$

Where $\Pi = \sum_{i=1}^{n} A_i$ and $\Gamma_K = -\sum_{i=K}^{P} A_i$

Yt is the n-variate or the time series of the variables under consideration.

Where Δ is the first difference lag operator, yt is a $(kx1)$ random vector of time series variables with order of integration equal to one, I(1), u_t is a (kx1) vector of constants, ε_t is a sequence of Zero-mean P- dimensional white noise vectors.

The interpretation of (1) depends crucially on r , the rank of the matrix Π.

If r = 0, the processes are all I(1) and not cointegrated.

If r = n, the processes are all I(0).

Cointegration occurs in between, when $0 < r < n$ and Π can be written as $\alpha\beta'$. In this case, y_t is I(1), but the combination $z_t = \beta' y_t$ is I(0).

In this case equation (2) can be written as

$$\Delta y_t = \mu_t + \alpha\beta' y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-1} + \varepsilon_t \ldots\ldots\ldots(2)$$

The rank of Π is investigated by computing the eigen-values of a closely related matrix.

If all the eigen-values are significantly different from 0, then all the processes are stationary.

If, on the contrary, there is at least one zero eigen-value, then the y_t process is integrated, although some linear combination $\beta' y_t$ might be stationary.

At the other extreme, if no eigen-values are significantly different from 0, then not only is the process y_t non-stationary, but the same holds for any linear combination $\beta' y_t$; in other words, no cointegration occurs.

Estimation typically proceeds in two stages: first, a sequence of tests is run to determine r, the cointegration rank. Then, for a given rank the parameters in equation (3) are estimated.

3.2.2 THE JOHANSEN COINTEGRATION TESTS:

In this study, the two Johansen tests for cointegration are used to establish the rank of β ; in other words, the number of cointegration vectors the system has. These are the maximum eigenvalue ("$\lambda - \text{Max}$") test, for hypotheses on individual eigen-values, and the "trace" test,

for joint hypotheses. The Maximum eigen-value statistics test the null hypothesis that there are r cointegrating vectors against the alternative of r+1 cointegrating vectors while the trace statistics tests the null hypothesis of no cointegrating vector against the alternative of at least one cointegrating vector. Suppose that the eigen-values λ_i are sorted from largest to smallest. The null hypothesis for the "λ_i-max" test on the i-th eigen-value is that $\lambda_i = 0$. The corresponding trace test, instead, considers the hypothesis $\lambda_j = 0$ for all $j \geq i$.

The asymptotic critical values are given in Johansen (1991) and MacKinnon-Haug Michelis(1999).

3.2.3 SELECTION OF LAG LENGTH BASE ON INFORMATION CRITERION

The researcher applied the Schwarz-Bayesian (BIC) and Hannan-Quinn (HQ) information criterion to determine the optimum number of lags for the model.

Information criterion is a statistic used to estimate the optimum number of lagged variables to include in an autoregression or a distributed lag model. The following are the reasons the researcher employed the Information Critrerion to obtain the appropriate lag;

i) If the order is too low there will be omission of potentially valuable information contained in the more distant lagged values thereby decreasing forecast accuracy.

ii) On the other hand if it is too high, more unnecessary coefficients will be estimated, which in turn introduces additional estimation error in forecasting.

iii) it ensures that only important information are captured in the system.

The appropriate lag length is determined by allowing a different lag length for each equation at each time and choosing the model with the lowest BIC and HQ values. The same sample period must be considered for different lag lengths.

3.2.4 TEST OF STATIONARITY:

Test for stationarity is also refers to unit root test. The Unit root test is done to find the order of integration of the series of each selected variables. The order of integration implies the order of difference before stationarity is achieved. The import of this is to;

i) avoid spurious regression by the use of ordinary regression analysis:

Bierens (2007), regressions involving unit root processes may give spurious results

ii) Determine whether the time series are of the same order for cointegration analysis to be possible. The two Unit root test are applied to investigate the order of integration of each series are the Augmented Dickey–Fuller (ADF) and KPSS (Kwaitowski, Phillips,Schmidt and Shin, 1992) tests.

3.2.5 THE ADF TEST

The Augmented Dickey–Fuller (ADF) test is the t-statistic on δ in the following regression:

$$\Delta yt = u_t + \delta y_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta Y_{t-i} + \varepsilon_t.$$

This test statistic is probably the best-known and most widely used unit root test. It is a one-sided

test whose null hypothesis is $\delta = 0$ versus the alternative $\delta < 0$. This means that under the null, y_t must be differenced at least once to achieve stationarity as against the alternative that y_t is already stationary and no differencing is required. Large negative values of the test statistic lead to the rejection of the null. The critical values at 10%, 5% and 1% levels are respectively giving as -3.12, -3.41 and -3.96.((Stock and Watson 2007, page 563, Table 14.5,)

Davidson, R. and MacKinnon, J. (1993))

Criticism of DickeyFuller

• Brooks ,(2008), a major criticism is that the power of the tests is low if the process is stationary but with a root close to the non-stationary boundary. That is the ADF unit root testing procedure is that it cannot distinguish between unit root and near unit root processes especially when using small samples of data.

• One way to get around this is to use a stationarity test of KPSS test (Kwaitowski, Phillips, Schmidt and Shin, 1992) as well as the ADF unit root tests.

3.2.6 KPSS STATIONARY TEST

In order to overcome the problem associated with ADF test, I use KPSS test in addition, where the null is of stationarity against the alternative of a unit root. That is the hypothesis of

H0: Y_t is stationary

H1: Y_t is nonstationary

This ensures that the alternative will be accepted (null rejected) only when there is strong evidence for (against) it [Kwiatkowski, Phillips, Schmidt. and Shin (1992)].

3.2.7 IMPULSE RESPONSE ANALYSIS :

Impulse response function (IRF) tracks the impact of any variable on others in the system. It is an essential tool in empirical causal analysis and policy effectiveness analysis.

An impulse response function traces the response of an endogenous variable to one standard deviation shock or change to one of the disturbance terms in the system. A shock to a variable is transmitted to all of the endogenous variables through the dynamic structure of the Auto regression model (VAR).

Therefore, an impulse response function shows the interaction between/among the endogenous variables. Graphical representation (impulse response function graph) is used to portray the pictorial view of the response of the system over time after a unit shock

3.2.8 VARIANCE DECOMPOSITION:

Variance decomposition analysis provides information about the dynamic behavior of the model and the relative importance of each random disturbances or innovation to the stock exchange performance.

Variance decomposition shows the proportion of the movements in the endogenous variable sequence as a result of its own shocks against shocks to other variables. (See Hondroyiannis andPapapetrou 2001)

CHAPTER FOUR

DATA ANALYSIS:

4.1.0 Descriptive Statistics (Full data in Appendix I)

Table 2 presents a summary of descriptive statistics of the variables. It shows the sample mean,
standard deviation, Minimum, Maximum and Median.

TABLE 2 Summary Statistics, using the observations 1994:1 - 2007:4

Variable	Mean	Median	Minimum	Maximum
LN_DSI_	7.28368	6.98800	5.42957	9.02271
LN_TB_	3.21613	3.30898	2.24071	3.82852
LN_CPI_	3.01579	2.89540	2.20069	4.24940
LN_exhange_	0.883622	0.363537	0.0439690	2.40447
Variable	Std. Dev.			
LN_DSI_	1.12106			
LN_TB_	0.500824			
LN_CPI_	0.548558			
LN_EX	0.832988			

The high standard deviation of 1.12 of LNDSI with respect to the mean implies the relative high volatility in the stock market.

4.2.0 UNIT ROOT TEST: ADF and KPSS test were used. (Full test is in Appendix II)

4.2.1Augmented Dickey-Fuller (ADF) test Result:

H0: z(t) is Unit root;

H1: z(t) is Stationarity

Table 3

Variable z(t)	Test statistics (t-values)	5% Critical value	10% critical value	P-Value	conclusion	
					5%	10%
LNDSI	-0.9984	< -2.89	< -2.58	0.75000	Accept H0	Accept H0
LN[TB]	0.0783	< -2.89	< -2.58	0.96000	Accept H0	Accept H0
LN[CPI]	-1.3463	< -2.89	< -2.58	0.61000	Accept H0	Accept H0
LN[EX]	-2.5179	< -2.89	< -2.58	0.11000	Accept H0	Accept H0

With all the variables, the test statistics for each variable is greater than both 5% and 10% critical values. Also all the reported p-values[1] are greater than 0.05 and 0.1, hence the null hypothesis (H0) that each variable is a unit root, that is, that all the variables are non-stationary, against stationary at 5% and 10% significance level can no be rejected. However since the ADF test has lower power of detecting stationarity KPSS test was conducted to complement it as shown below.

4.2.2 KPSS Test Result

Null hypothesis H0: z(t) = stationary

Alternative hypothesis H1: z(t) is a unit root process:

Table 4

VARIABLE	Test statistics	5% critical Value	10% critical value	Conclusion	
				5%	10%
LNDSI	1.3804	> 0.463	> 0.347	Reject H0	Reject H0
LN[TB]	0.8861	> 0.463	> 0.347	Reject H0	Reject H0
LN[CPI]	0.6383	> 0.463	> 0.347	Reject H0	Reject H0
LN[EX]	1.4302	> 0.463	> 0.347	Reject H0	Reject H0

KPSS test has a higher power to detect non-stationarity than ADF test, hence is used as complimentary to ADF test.

The null hypothesis (H0) of stationarity is rejected when the test statistics is greater than the critical value at given significance level of 5% or 10%.

In this case, KPSS test for stationarity of each variable is rejected in favour of non-stationarity at both 5% and 10% significance. Since the variables are non-stationary, if conventional regression method is used to identify the relation between them, forecasts and inference base on it can be misleading and unreliable and hence the need to apply the cointegration method.

4.3. INFORMATION CRITERIA RESULT:

Table 5

p	Hannan-Quinn	Schwarz
1	-1.70487E+01	-1.63324E+01
2	-1.82724E+01	-1.71863E+01
3	-1.84730E+01	-1.70087E+01
4	-1.85072E+01	-1.66561E+01
p =	4	2
	Information criteria	
p	Hannan-Quinn	Schwarz
5	-1.83331E+01	-1.60863E+01
6	-1.84657E+01	-1.58137E+01
p =	4	2

The information criterion was used to find how many lags (p, past values or parameters) of the variables contains the necessary information to be included in the model. The P refers to the number of lags tested. The P that corresponds to either the minimum value of estimated Hannan-Quinn or Shwarz model is chosen as the appropriate lag length for the cointegration analysis. Six lags were tested. From the table above the minimum values for Hannan-Quinn or Schwarz model are -1.85072E+01 and -1.71863E+01 respectively. This value corresponds to p values of 4 and 2 respectively. Hannan-Quinn estimated value was selected for this analysis, since the Schwarz criterion has the tendency of being too parsimonious in the selection of P.

4.4 .0 JOHANSEN COINTEGRATION TEST (See Appendix III for the full details)

Table 6: Johansen test: Case 3: Unrestricted constant

Rank (r)	Trace test	p-value	Lmax test	p-value
0	58.804	[0.0028]	28.425	[0.0355]
1	30.380	[0.0426]	15.758	[0.2491]
2	14.621	[0.0662]	8.6079	[0.3277]
3	6.0134	[0.0142]	6.0134	[0.0142]

The table shows the trace and Lamda test statistics with their corresponding probability values.

LR test (trace test) of the null hypothesis that there is at most r cointegrated vectors against the alternative that there are 4 cointegrated vectors.

LR test (Lambda-max test) of the null hypothesis that there are r cointegrated vectors against the alternative that there are r + 1 cointegrated vectors.

Test revealed the existence of one cointegration vector. It can be seen from the first row of the table that both the trace test and Lmax test reject the null hypothesis that there is 0 cointegrated vectors against the alternative of at least 1cointegrated vector. At 5% significance level both test reject the existence of 0 number cointegration vectors since their respective p-values of 0.0028 and 0.0355 are less than 0.05. The rejection of 0 number cointegration vector at 5% significance means that it is about 95% ,at least sure statistically, to correctly accept 1cointegrated vector. With a test of r=1 against r=2 the P-value of the Lambda test statistics is 0.2491. This relatively high P-value confirms the acceptance of 1cointegrated vector.

Having the evidence from the cointegration test in support of the existence of one cointegration vector, the VECM was employed to identify the normalised cointegration vectors.

4.4.1 VECM System result. (The full result is in Appendix IV)
lag order 4
Cointegration rank = 1

Case 3: Unrestricted constant

Beta (cointegrating vectors, standard errors in parentheses)

LN_DSI_	LN_TB_	LN_CPI_	LN_ex_
1.0000	0.25368	1.5541	0.66018
(0.00000)	(0.35997)	(0.34802)	(0.15287)

This cointegration vector is used to form the long run relation between the variables as follows:

LN_DSI= -0.25368LN_TB -1.5541 LN_CPI - 0.66018LN_EX

The standard error measures the reliability of the estimate. A larger standard error indicates a wider confidence interval in which the true value of the coefficient can be expected. In this case the reported standard errors for the estimated coefficients of the variables are relatively small. This implies that it is about 95 % sure that the lower and upper limit of the coefficient of LN_TB, LN_CPI and LN_EX are (-0.46626 - 0.97362), (0.85806-2.25014), (0.35444-0.96592) respectively. Thus, it is 0.95 probable that the reported coefficients can vary within the respective given range.

TABLE 7: Equation 1: d_LN_DSI

	Coefficient	Std. Error	t-ratio	p-value	
const	0.677253	0.420675	1.6099	0.11548	
d_LN_DSI__1	0.698013	0.158355	4.4079	0.00008	***
d_LN_DSI__2	-0.124203	0.189012	-0.6571	0.51497	
d_LN_DSI__3	0.119412	0.147615	0.8089	0.42346	
d_LN_TB__1	-0.308427	0.239208	-1.2894	0.20487	
d_LN_TB__2	0.445467	0.244132	1.8247	0.07571	*
d_LN_TB__3	-0.0636363	0.248307	-0.2563	0.79908	
d_LN_CPI__1	-0.107169	0.0989145	-1.0834	0.28526	
d_LN_CPI__2	0.061252	0.102363	0.5984	0.55305	
d_LN_CPI__3	0.142204	0.0995762	1.4281	0.16123	
d_LN_exhange__1	-0.895027	0.386544	-2.3155	0.02594	**
d_LN_exhange__2	1.0116	0.468971	2.1571	0.03722	**
d_LN_exhange__3	-0.182626	0.410566	-0.4448	0.65891	
S1	0.00795486	0.0497981	0.1597	0.87391	
S2	0.0433769	0.0479652	0.9043	0.37137	
S3	-0.0686996	0.0474849	-1.4468	0.15595	
EC1	-0.0491127	0.0308085	-1.5941	0.11898	

Mean of d_LN_DSI	0.069944	S.D. of d_LN_DSI	0.145083
Sum squared resid	0.471381	S.E. of regression	0.109939
R-squared	0.592831	Adjusted R-squared	0.425787
rho	0.045488	Durbin-Watson	1.860759

Table 7 shows the short term dynamic relation between DSI and the selected macroeconomic variables. In other words, it is an equation that indicates the short term changes in the system. The importance of this relation is to help to analyse the shocks in the system (impulse response analysis) and to account for the possible percentage contribution of each variable to the variations in the stock price. The lags with the asterisks indicate the past values of the variables that are crucial to the current short term changes in DSI (Share price). The three asterisks indicates that the immediate changes in past value of DSI (d_LN_DSI__1) had the most significant change in the current DSI values, follow by both the previous first and second quarter changes in exchange rate, the previous second quarter changes in T-Bill.

The standard error shows the extent to which estimated coefficient can deviate. S.D. refers to the standard deviation of a change in DSI. This means that the expected changes in DSI deviated by 0.145083 points by 68% all the time or 0.290166 points (2 times 0.145083) by

95% all the time. S.E. of regression is 0.109939 refers to the summary measure of the size of the equation's errors.

R-squared indicates the degree of 'fit' of the regression. R-squared of 0.592831means that the model can accounts for approximately 60% of the changes in share price (DSI). This means that the market is not efficient [1] since is not close to 0. In financial economics, 0.15 is preferred.

The t- ratio helps to identify which lags are useful in the relation, where useful coefficient is one with t-value greater in absolute value than 1.

Durbin Watson statistic is not a valid test of the strength of the relation since lagged observations of the dependent variable are used as an explanatory variable.

4.4.2 Table 8 **:Decomposition Of Variance For LN_DSI Result:**

period	Std.error	LN_DSI_	LN_TB_	LN_CPI_	LN_ex
1	0.091747	100.0000	0.0000	0.0000	0.0000
2	0.179401	93.3178	0.9872	2.6427	3.0523
3	0.25997	90.6108	1.4983	4.9307	2.9602
4	0.337709	90.5082	1.6726	5.2862	2.5330
5	0.400287	90.7325	1.5789	5.6026	2.0860
6	0.45151	90.6191	1.5112	6.1882	1.6815
7	0.493858	90.1858	1.6871	6.7185	1.4086
8	0.530702	89.0521	2.2383	7.4855	1.2242
9	0.566697	87.3160	3.1559	8.4407	1.0874
10	0.602906	85.3798	4.3078	9.3301	0.9823
11	0.638084	83.6013	5.4310	10.0812	0.8865
12	0.671053	82.2647	6.3453	10.5881	0.8019
13	0.700927	81.3621	7.0514	10.8317	0.7548
14	0.727888	80.7310	7.6134	10.9060	0.7496
15	0.753021	80.2702	8.0946	10.8742	0.7611
16	0.777358	79.9221	8.5305	10.7857	0.7616
17	0.801652	79.6606	8.9138	10.6800	0.7455

The variance decomposition is used to account for the percentage contribution of each variable to the changes in share price periodically and their associated standard errors. The percentage contributions are shown under the corresponding variables.

[1] **Dr. D.J.C. Smant, Introduction to practical econometrics, Erasmus University Rotterdam, Faculty of Economics, Monetary Economics**

4.5.0 FINDINGS AND DISCUSSIONS:

The test to determine the order of integration of the variables showed that all the variables are non-stationary at level, I(1), since the KPPS test of all the variables rejected the null hypothesis of stationarity. The KPPS test was used to conduct confirmation test as the ADF has lower test power in Unit root test.

The cointegration test revealed the existence of 1 cointegration among the variables as shown by both the Lambda maximum and Trace test at 5% significant level. The cointegration vector corresponding to the largest eigenvalue was chosen to identify the long run relationship as below;

LN_DSI= -0.25368LN_TB -1.5541 LN_CPI - 0.66018LN_EX

The long run equation indicates long run relationship between the variables.

From the equation there is a negative relationship between DSI and inflation. This finding is contrary to the Fisherian theory; thus on GSE investment does not provide hedged against inflation. The common stock investment (DSI) is negatively related to both anticipated and unanticipated inflation, at long run. The shares averagely grow by 1.6 with 1% drop in inflation at long run.

The result also shows a negative relation with exchange rate. This indicates that a depreciation of the cedis turn to have negative impact on the performance of Ghana stock exchange. A 1% appreciation of the Cedis increases share value averagely by approximately 0.7% at long run.

Depreciation exposes the companies to more currency risk especially those with foreign exchange debt component in their debt portfolio and hence their stocks becomes less attractive because of increase risk.

The short term equation (see table 3) of DSI and the selected macroeconomic variables shows the short run dynamics in the system that occur whenever each variable change. All the

variables have negative relation with DSI as indicated by the impulse response analysis. An increase in each variable in the previous period signaled a negative change in the price of stocks at the short run.

When the Cedi deprecate by one percent, the immediate increase in share value is approximately by 0.9% and 1% decrease in T-Bill (short term interest rate) causes about 0.3% rise in the values of shares averagely.

The asterisks indicate that, the most previous period changes all the macro variables and DSI are critical to a change in DSI in the next period. Changes in the DSI itself in the last quarter were very critical to the performance of DSI in the next period. It implies that investors were more critical about the changes that occurred on the DSI periodically. That in the short run, 1% change in DSI in the previous period caused about 0.7% change in share price averagely. When the stocks (DSI) perform well, (averagely about 1% increased in value), it became more attractive to investors to increased demand to bid up prices of stocks which eventually effect about 0.7% increased in stocks (DSI) value in the next period. A drop in inflation by 1% turns to improve the performance of the shares by 0.1% approximately in the next quarter. The error correction term (EC1) indicate that for every quarter economic forces in the system act to restore the system to equilibrium position by approximate value of 0.05% against disequilibrium.

4.5.1.VARIANCE DECOMPOSITION ANALYSIS:

From table 4 the percentage contribution of T-Bill and CPI to variation on DSI generally increases with time, whiles the exchange rate percentage contribution to DSI variations however seems to reduce generally over time.

Among the three macroeconomic variables, the percentage contribution of CPI in the changes in share price in the first year is the highest approaching 5%, T-Bill and Exchange rate close

in to 1.7% and 2.5% respectively.

In the second year, T-Bill and exchange rate averagely accounts for 1.5% each in the variation in share price, whiles CPI could explain about 6% changes in Share price.

From the fourth year to the fifth year CPI percentage contribution to the variation in share price remains fairly around 10%, however T-Bill approaches 11% with exchange rate minimizing to approximately 0.6%

4.5.2 IMPULSE RESPONSE ANALYSIS:

An alternative way to obtain the information regarding the short term relationships between the stock index and the three macro-economic variables is through the impulse response analysis. Figures 1, 2, and 3 (see Appendix IV for the graphs) present the impulse response graphs for stock price from one-standard deviation shock in interest rate, inflation and exchange rate.

Figure1 shows the response of the stock price in to a unit shock T-bill rate. There is an immediate drop in Stock prices in response to unit shock (unexpected increase) in T-Bill rate turn. Stock prices appear to stabilize after the first quarter through to 6th quarter. After the 6^{th} quarter prices of stocks falls gradually to remain constant after the 9^{th} quarter although negative. It indicates that stock price in Ghana is negatively related to interest rate emphasizing the inverse relation between stock price and interest rate.

Figure 2 shows the response of stock price (DSI) to inflation disturbance. It can be seen that Inflation shock has a general negative impact on stock price. The price declines sharply up to the third quarter. i.e. it decreases at an increasing rate up to the 2^{nd} quarter but the rate of declining (negative change) slows down , till price reach a minimum point at about 9^{th} period. The price picks up after the 10^{th} periods but it seems to remain negative for a long time, emphasizing the negative long run relationship. This result shows that stock price is

negatively related to both expected and unexpected inflation. This result is consistence with that of Fama and Schwert (1977), Geske and Roll (1983), Chen, Roll and Ross (1986). This implies the reaction of stock price to unexpected inflation seems to be greatest between the first and third quarter but the impact becomes minimal after the 3rd quarter although it still remains at a negative price change.

The higher the inflation, the riskier real stock returns are perceived to be. Higher inflation is associated with greater uncertainty about the economy, which tends to induce a higher required rate of return on equity. In addition, a higher risk will instigated a lower level of stocks prices.

In Ghana when inflation goes up the central bank correspondingly adjust T-bill rate, making the returns from short term investment of T-bill more attractive to potential investors. With the increase in T-bill rate, even existing stockholders make panic spellings to invest in T-bills, consequently when the supply becomes more than demand prices immediately falls. The impact of a unit shock in Ti-bill on stock price appears to be almost similar to that of inflationary shock.

Figure.3 shows the response of DSI to exchange rate shock: The response of DSI to the cedi depreciation is interesting. From the figure, it can be observed that a shock in exchange rate i.e unexpected depreciation of the cedis causes an immediate sharp decline in the price of stocks in the first quarter and stabilizes till the 3rd quarter. However, stock price picks up after the 3rd quarter to recover from it lost value temporarily. After the 10th period the change in price appears to remain positive for some time. The sharp decline in stock price from in the first quarter might be due to the panic nature at which both existing and potential stock investors prefer to hold their money in foreign currency, leading to slow market activities,

hence demand of stock falls. The second reason is that cedi depreciation creates inflationary effects in the economy, which in turn increases interest rates.

In Ghana, most people prefer to buy foreign currency as a form of investment when the cedis begin to depreciate, in order to keep the value their money. Ghana is import dominated economy and that depreciation of the GHS is bad for the economy in general.

Nonetheless, stock price appear to recover from the shock after the 3rd periods, a result that persists for the medium term. This portion of the result may be explained by the fact that currency depreciation tends to improve the competitive position of domestic industries in the medium term, resulting in higher profitability and positive change in stock prices.

CHAPTER FIVE

5.0 INTRODUCTION:

This chapter shows summary of results and findings obtained from this study which investigated the relationship between Ghana exchange performance and the selected macro-economic variable.

With regard to summarizing the findings and the result, a brief discussion of the identified relation between the variables is made.

This chapter also contains the conclusion of the results and the recommendation.

5.1 SUMMARY OF FINDINGS:

Using Johansen's methodology for multivariate analysis and quarterly time-series data, the dynamic interrelations between macroeconomic variables and stock price were examined. The specific macro economic variables selected to examine the way in which the economic activity movements affect the performance of the stock market in Ghana were interest rate, exchange rate and inflation.

The major finding of the analysis is that the all the macroeconomic variables affect the performance of the Ghana stock market both at short run and long run. However, the fluctuations of the Ghana stock market are not fully predictable by these variables, as a substantial proportion of the variation in the stock market depends on it own performance.

Impulse response analysis shows that Ghana stock market respond negatively to all the macroeconomic variables, however the stock price seems to recover from exchange shock in the medium term.

5.2 CONCLUSIONS

The result from the cointegration analyses revealed long run relationship between share prices and the macroeconomic variables identified over the time horizon in this study.

The long run equation indicated negative relation between share price and all the macroeconomic variables implying that increases in them causes a decline in share prices.

Inflation seems to have the highest impact on share price in Ghana among the three economic variables at the long run. This is supported by the figures of the variance decomposition of the DSI. The fact that inflation is negatively related to DSI means that stock investment are not hedge against inflation on Ghana stock exchange. In the short term, to medium term shocks to all the macro-economic variables generate opposite shocks to share prices.

It is also observed that the most immediate past behavior of the security's price is significant rich in information concerning its successive Price. Also the most previous quarter's change in exchange rate and T-Bill are significant to the successive share price change.

The is also an evidence that Ghana stock exchange index (share price) react opposite to both unanticipated and anticipated changes in the macroeconomic variables.

5.3 RECOMMENDATIONS.

I recommend that investors and corporate managers should pay attention to interest rate, exchange rate changes and especially since they have long run negative impact on share price. Although the selected macro factors affect the performance of Ghana stock exchange (share price) , stakeholders also should seriously consider other factors, not considered in this studies, that has the potential to affect stock price.

Potential investors should not buy stocks when the rate of inflation, interest and depreciation of the cedis keep rising but rather look for alternate investments, as the present value of their investments is likely to fall in such economic situation. Stockholders should short sell their stocks in times of higher increases in these selected economic variables. Both investors and corporate bodies are also advised to diversify into investments that have positive correlation

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APPENDIX

LOGARITHM OF THE TIME SERIES:

Appendix I

obs	LN_DSI	LN_TB_	LN_CPI	LN_ex_
1991:1	NA	3.444348	3.303045	3.350441
1991:2	NA	3.465736	2.979670	3.312297
1991:3	NA	3.431483	2.663099	3.292665
1991:4	NA	3.117280	2.506728	3.263750
1992:1	NA	2.890372	2.065533	3.236598
1992:2	NA	2.890372	2.137561	3.195120
1992:3	NA	2.921863	2.408222	3.114053
1992:4	NA	3.128107	2.532020	2.997436
1993:1	NA	3.352076	3.115848	2.866540
1993:2	NA	3.441097	3.190794	2.809939
1993:3	NA	3.465736	3.248357	2.699662
1993:4	NA	3.465736	3.292681	2.590805
1994:1	5.429566	3.295837	3.095290	2.404474
1994:2	5.984982	3.295837	3.043406	2.370786
1994:3	5.911485	3.315143	3.177490	2.339129
1994:4	5.921966	3.378351	3.456771	2.286315
1995:1	5.921107	3.496508	3.664803	2.237696
1995:2	5.945865	3.496508	4.020942	2.171494
1995:3	5.944408	3.552192	4.233648	2.112769
1995:4	5.971781	3.701302	4.249398	1.979237
1996:1	5.974193	3.701302	4.209367	1.887607
1996:2	6.065016	3.717291	3.990667	1.825088
1996:3	6.112035	3.742235	3.673104	1.781125
1996:4	6.071833	3.754511	3.507550	1.758396
1997:1	6.046562	3.756538	3.414950	1.703695
1997:2	6.112138	3.756538	3.375391	1.612573
1997:3	6.207111	3.756538	3.284623	1.528451
1997:4	6.394252	3.754037	2.911654	1.503762
1998:1	6.679183	3.679659	2.744997	1.474539
1998:2	7.123568	3.638261	2.900270	1.459152
1998:3	7.013217	3.489719	2.727601	1.459152
1998:4	6.856591	3.289269	2.793598	1.459152
1999:1	6.917806	3.263318	2.686945	1.443527
1999:2	6.865556	3.221731	2.298096	1.403360
1999:3	6.819705	3.198809	2.497652	1.352931
1999:4	6.779073	3.389725	2.569818	1.129917
2000:1	6.779668	3.449988	2.702749	0.965888
2000:2	6.883500	3.505343	2.926856	0.724064
2000:3	6.882732	3.678361	3.283399	0.467889

2000:46.913587 3.7033593.671351 0.378553
2001:16.930193 3.7489783.713411 0.348521
2001:26.962784 3.8285173.639280 0.325223
2001:37.034800 3.7541133.453925 0.333582
2001:47.016688 3.4804873.155154 0.325426
2002:17.037052 3.2102702.890529 0.296781
2002:27.176918 3.1694002.659893 0.242091
2002:37.315942 3.2435192.577508 0.206656
2002:47.371176 3.2638432.645707 0.186778
2003:17.479038 3.3028123.188305 0.158336
2003:27.702986 3.4240683.393597 0.143139
2003:37.978388 3.3740933.324611 0.137943
2003:48.242027 3.0665643.176224 0.130458
2004:18.601014 2.8261772.628606 0.115728
2004:28.979933 2.8164022.437816 0.103378
2004:39.022709 2.7903422.534611 0.101464
2004:48.986184 2.7952462.498973 0.101184
2005:18.969697 2.8005222.635871 0.099411
2005:28.879190 2.7919712.785611 0.097735
2005:38.713652 2.6688852.699555 0.098478
2005:48.700723 2.5117232.721147 0.095855
2006:18.687195 2.3224852.515348 0.092324
2006:28.703079 2.2546642.200695 0.088935
2006:38.718459 2.3025512.376781 0.084038
2006:48.736318 2.3062222.435485 0.081451
2007:18.753757 2.2533172.350993 0.078700
2007:28.794655 2.2407092.373465 0.076053
2007:38.873385 2.2540782.326887 0.068471
2007:48.989810 2.3232602.431878 0.043969
2008:1NA NA NA 0.025561
2008:2NA NA NA -0.006992

APPENDIX II

EasyReg International [February 25, 2008]

Session date: Tuesday August 25, 2009

Session time: 23:02:02

UNIT ROOT TEST OF LN[DSI]

Augmented Dickey-Fuller (ADF) test 2.

Auxiliary model:

$z(t)-z(t-1) = a.z(t-1) + b(1).(z(t-1)-z(t-2)) + ...$

$+ b(p).(z(t-p)-z(t-p-1)) + b(p+1) + u(t)$,

$t = p+2,...,n$, where $u(t)$ is white noise. Notice: $b(p+1)$ is the intercept.

Null hypothesis H(0):

$z(t)$ is a unit root process: $a = 0$.

Alternative hypothesis (H1):

$z(t)$ is stationary process: $a < 0$.

The test statistic is the t-value of a.

$p = 4$

Variable to be tested:.

$z(t) = LN[DSI]$

H0: Unit root; H1: Stationarity around a constant

ADF model for $z(t)-z(t-1)$:

	OLS estimate	t-value	Asymptotic critical regions:
z(t-1)	-0.0121	-0.9984 < -2.89 (5%)	
		< -2.58 (10%)	
		p-value = 0.75000	

Test result:

H0 is not rejected at the 10% significance level

KPSS stationarity test (LNDSI)

Null hypothesis H0: $z(t) = c + u(t)$, where $u(t)$ is a zero-mean stationary process and c a constant.

Alternative hypothesis H1: $z(t)$ is a unit root process: $z(t) = z(t-1)+u(t)$

5% critical region	10% critical region
> 0.463	> 0.347

Test results:

Test statistic	Conclusion (5%)	Conclusion (10%)
1.3804	(reject H0)	(reject H0)

TEST FOR LN[TB]

Augmented Dickey-Fuller (ADF) test 2.

Auxiliary model:

$z(t)-z(t-1) = a.z(t-1) + b(1).(z(t-1)-z(t-2)) + ...$

$+ b(p).(z(t-p)-z(t-p-1)) + b(p+1) + u(t),$

$t = p+2,...,n$, where $u(t)$ is white noise. Notice: $b(p+1)$ is the intercept.

Null hypothesis H(0):

$z(t)$ is a unit root process: $a = 0$.

Alternative hypothesis (H1):

$z(t)$ is stationary process: $a < 0$.

The test statistic is the t-value of a.

$p = 4$

Variable to be tested:

$z(t) = LN[TB]$

H0: Unit root; H1: Stationarity around a constant

ADF model for $z(t)-z(t-1)$:

	OLS estimate	t-value Asymptotic critical regions:
z(t-1)	0.0022	0.0783 < -2.89 (5%)
	.	< -2.58 (10%)
		p-value = 0.96000

Test result:

H0 is not rejected at the 10% significance level

KPSS stationarity test

Null hypothesis H0: $z(t) = c + u(t)$, where $u(t)$ is a zero-mean stationary process and c a constant.

Alternative hypothesis H1: $z(t)$ is a unit root process: $z(t) = z(t-1)+u(t)$

ault values of c and r are c = 5, r = .25

$m = 4$

5% critical region	10% critical region
> 0.463	> 0.347

Test results:

Test statistic	Conclusion (5%)	Conclusion (10%)
0.8861	(reject H0)	(reject H0)

Variable to be tested:

$z(t) = LN[CPI]$

Augmented Dickey-Fuller (ADF) test 2.

Auxiliary model:

$z(t)-z(t-1) = a.z(t-1) + b(1).(z(t-1)-z(t-2)) + ...$
$+ b(p).(z(t-p)-z(t-p-1)) + b(p+1) + u(t),$

$t = p+2,...,n$, where $u(t)$ is white noise. Notice: $b(p+1)$ is the intercept.

Null hypothesis H(0):

$z(t)$ is a unit root process: $a = 0$.

Alternative hypothesis (H1):

$z(t)$ is stationary process: $a < 0$.

The test statistic is the t-value of a.

$p = 4$

Variable to be tested:

$z(t) = LN[CPI]$

H0: Unit root; H1: Stationarity around a constant

ADF model for $z(t)-z(t-1)$:

	OLS estimate	t-value Asymptotic critical regions:
z(t-1)	-0.0724	-1.3463 < -2.89 (5%)
		< -2.58 (10%)
	.	p-value = 0.61000

Test result:

H0 is not rejected at the 10% significance level

KPSS stationarity test for LN[CPI]

Reference: Kwiatkowski, D., P. Phillips, P. Schmidt, and Y. Shin (1992)
Testing the Null of Stationarity Against the Alternative of a Unit Root
Journal of Econometrics 54, 159-178.

Null hypothesis H0: $z(t) = c + u(t)$, where $u(t)$ is a zero-mean stationary process and c a constant.

Alternative hypothesis H1: $z(t)$ is a unit root process: $z(t) = z(t-1)+u(t)$

$m = 4$

5% critical region	10% critical region
> 0.463	> 0.347

Test results:

Test statistic	Conclusion (5%)	Conclusion (10%)
0.6383	(reject H0)	(reject H0)

Augmented Dickey-Fuller (ADF) test 2.LN[ex]

Auxiliary model:

$z(t)-z(t-1) = a.z(t-1) + b(1).(z(t-1)-z(t-2)) + ...$
$+ b(p).(z(t-p)-z(t-p-1)) + b(p+1) + u(t),$

$t = p+2,...,n$, where $u(t)$ is white noise. Notice: $b(p+1)$ is the intercept.

Null hypothesis H(0):

$z(t)$ is a unit root process: $a = 0$.

Alternative hypothesis (H1):

$z(t)$ is stationary process: $a < 0$.

The test statistic is the t-value of a.

$p = 4$

Variable to be tested:

$z(t) = LN[ex]$

H0: Unit root; H1: Stationarity around a constant

ADF model for $z(t)-z(t-1)$:

	OLS estimate	t-value Asymptotic critical regions:
z(t-1)	-0.0134	-2.5179 < -2.89 (5%)
		< -2.58 (10%)
		p-value = 0.11000

Test result:

H0 is not rejected at the 10% significance level

KPSS stationarity test

Reference: Kwiatkowski, D., P. Phillips, P. Schmidt, and Y. Shin (1992)
Testing the Null of Stationarity Against the Alternative of a Unit Root
Journal of Econometrics 54, 159-178.

Null hypothesis H0: $z(t) = c + u(t)$, where $u(t)$ is a zero-mean stationary process and c a constant.

Alternative hypothesis H1: $z(t)$ is a unit root process: $z(t) = z(t-1)+u(t)$

$m = 4$

5% critical region	10% critical region
> 0.463	> 0.347

Test results:

Test statistic	Conclusion (5%)	Conclusion (10%)
1.4302	(reject H0)	(reject H0)

APPENDIX III

Johansen test:

Number of equations = 4

Lag order = 4

Estimation period: 1994:1 - 2007:4 (T = 56)

Case 3: Unrestricted constant

Rank	Eigenvalue	Trace test p-value	Lmax test p-value
0	0.39805	58.804 [0.0028]	28.425 [0.0355]
1	0.24527	30.380 [0.0426]	15.758 [0.2491]
2	0.14248	14.621 [0.0662]	8.6079 [0.3277]
3	0.10182	6.0134 [0.0142]	6.0134 [0.0142]

eigenvalue 0.39805 0.24527 0.14248 0.10182

beta (cointegrating vectors)

LN_DSI_	2.0971	-1.7298	-2.4152	0.86814
LN_TB_	0.53199	-5.0142	-1.2632	0.45399
LN_CPI_	3.2591	1.3542	1.2063	0.22620
LN_ex_	1.3844	-1.1119	-2.8560	-0.58499

alpha (adjustment vectors)

LN_DSI_	-0.023420	0.018839	0.029424	-0.0025691
LN_TB_	-0.0039445	0.029023	-0.0048804	-0.0071024
LN_CPI_	-0.071588	0.022880	-0.026982	0.017511
LN_ex_	0.010164	0.0016800	0.0035159	0.010563

renormalized beta

LN_DSI_	1.0000	0.34498	-2.0022	-1.4840
LN_TB_	0.25368	1.0000	-1.0472	-0.77606
LN_CPI_	1.5541	-0.27008	1.0000	-0.38667
LN_ex_	0.66018	0.22176	-2.3676	1.0000

renormalized alpha

LN_DSI_	-0.049113	-0.094463	0.035493	0.0015029
LN_TB_	-0.0082719	-0.14553	-0.0058871	0.0041548
LN_CPI_	-0.15012	-0.11472	-0.032548	-0.010244
LN_ex	0.021314	-0.0084241	0.0042411	-0.0061794

long-run matrix (alpha * beta')

	LN_DSI_	LN_TB_	LN_CPI_	LN_exhange_
LN_DSI_	-0.15499	-0.14526	-0.015904	-0.13590
LN_TB_	-0.052854	-0.14468	0.018954	-0.019639
LN_CPI_	-0.10933	-0.11077	-0.23092	-0.057733
LN_ex	0.019087	-0.0026628	0.042031	-0.0040177

APPENDIX IV

FIGURE 1

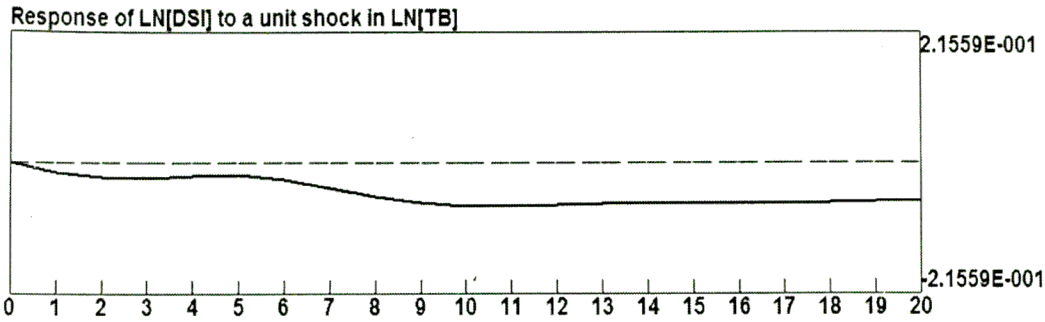

FIGURE 2

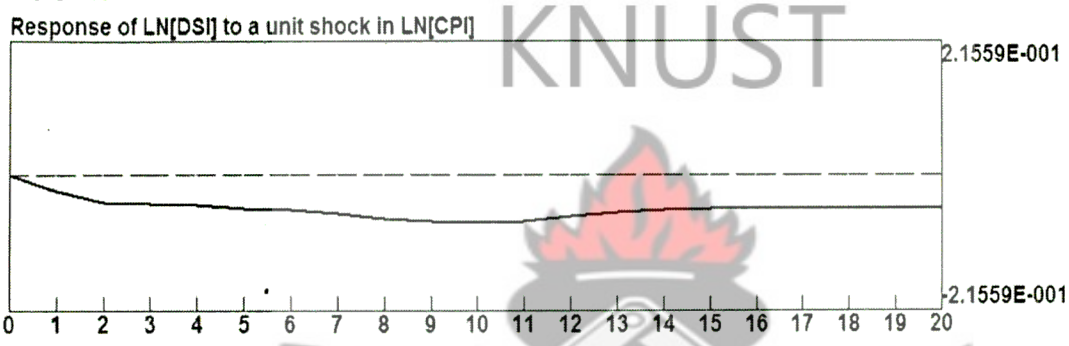

FIGURE 3

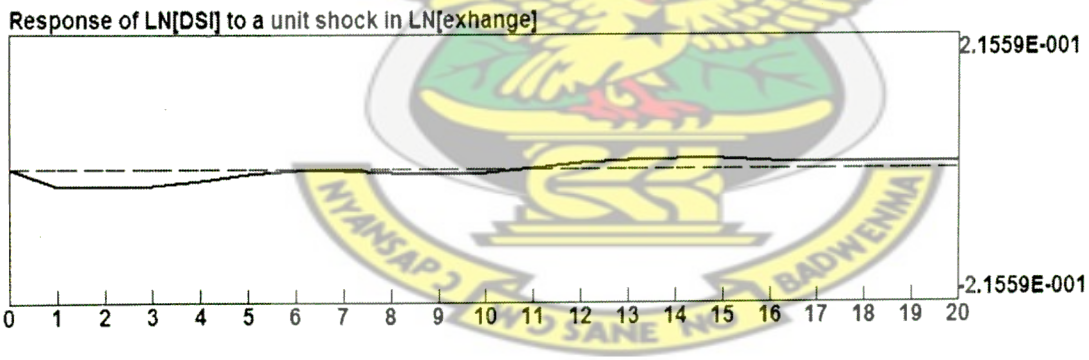

FIGURE 4