KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

COLLEGE OF HUMANITIES AND SOCIAL SCIENCE

DEPARTMENT OF ECONOMICS

THE RELATIONSHIP BETWEEN INTEREST RATE AND STOCK PRICE. EMPIRICAL STUDY ON GHANAIAN LISTED FIRMS

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A THESIS SUBMITTED TO THE DEPARTMENT OF ECONOMICS, KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARDS OF MASTER OF SCIENCE DEGREE IN ECONOMICS

BY

MAY, 2016

DECLARATION

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

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(PG2728914) **Signature** **Date**

I declare that I have supervised the above student in undertaking the study reported herein, and confirm that she has my permission to submit for assessment.

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DEDICATION

This work is dedicated to the Almighty God, my husband, Dr. Emmanuel Affum Ampoma and mother Mrs. Janet Opoku. Without their enormous support I would not have reached this height in education. I also dedicate it to my brother, Samuel Owusu – Afriyie.

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ABSTRACT

The issue of whether stock prices and interest rate are related or not, is an important one especially with increased international trade and the integration of global financial markets. A fall in interest rates on money market instruments like treasury, fixed deposits and call accounts make them less attractive in terms of the returns they yield. Investors typically react to such a fall by transferring their investments in stock market. The study therefore set out to investigate the impact of interest rate on stock prices in Ghana by employing OLS model with monthly data spanning from January, 2000 to September, 2010. The study further used Granger causality test to determine the direction of causality between interest rate and stock prices in the context of Ghana. The empirical results indicated that interest rate had a significant negative effect on stock price in Ghana. The study also revealed that there existed a direct relationship between inflation and stock price and it was found to be significant. Further, it was found that the changes in stock prices are explained by the variations in interest rate whereas the changes in stock price do not in turn influence the changes in interest rate. This means that there is unidirectional causality between interest rate and stock prices as in the case of Ghana. It was suggested that in an attempt to positively influence the AllShares index, government can resort to the use of expansionary fiscal policy measures since it was found that government activities affect the market index positively.

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INTRODUCTION

1.1 Background to the Study

A broad consensus has emerged in recent decades emphasizing the idea that stock markets occupy a strategic position in both developing and industrialized nations; it has become a significant component of a country‟s financial system and a common feature of a modern economy (Van-Treek, 2009; Obstfeld, 1986). The price of stock and other assets is an important part of the dynamics of economic activities and can influence or be an indicator of social mood and business performance. History has shown that the performance of a stock market is perhaps the most potent instrument for measuring social or economic developments in any economy. Drabenstott and Meeker (1999) call it a barometer for the economy. Stock market facilitates all the key prospects of the financial system, such as capital mobilization, investment opportunities, risk distribution and exert corporate control.

The creation of the Ghana Stock Exchange (GSE) was part of the recommendations of the economic reforms carried out in the 1980s to generate sustainable economic growth and development. As Boateng (2004) observes, after many years of experiment with heavy state intervention in the economy, a consensus emerged that the achievement of a more dynamic economic growth required a greater role for the private sector and stock markets since they are good levers for boosting private sector access to finance.

The Ghanaian stock market (GSE) described as one of the emerging markets was established in July 1989 as a private company limited by guarantee under the Companies Code of 1963 (Act 179) and commenced trading on 12 Nov 1990 to encourage private investment in

Ghana. However, the status of the company was changed to a public company limited by guarantee under the Company‟s Code in April 1994. The GSE is regulated by the Securities and Exchange Commission, under the Securities Industry Law, PNDCL 333, 1993, as amended. The GSE has however been making remarkable impressions with 37 companies currently listed on the stock exchange. Various programmes and policies have been implemented by government with the aim of achieving more favourable macroeconomic environment to foster private investment.

Since its inception, the GSE's listings have been included in the main index, the GSE AllShare Index. In 1993, the GSE was the sixth best index performing emerging stock market, with a capital appreciation of 116%. In 1994 it was the best index performing stock market among all emerging markets, gaining 124.3% in its index level. 1995's index growth was a disappointing 6.3%, partly because of high inflation and interest rates. Growth of the index for 1997 was 42%, and at the end of 1998 it was 868.35 .As of October 2006 the market capitalization of the Ghana Stock Exchange was about 111,500 billion cedis ($11.5 billion). As of December 31, 2007, the GSE's market capitalization was 131,633.22 billion cedis. In 2007, the index appreciated by 31.84%.

With a drop of 46.58% in the GSE All-Share index, the Ghana Stock Exchange ended the year 2009 as the least performing market in Africa. In the previous year 2008, the gain in the GSE All-share Index of 58% put Ghana ahead of all the African markets. Due to the continuous improvement at GSE, in 2010, it was adjudged the most innovative African Stock Exchange at the African Investor (Ai) prestigious annual index series awards held at the New York Stock Exchange out of seven African Stock Exchanges nominated.

In the year 2009, the stock market went through a difficult situation and this was against the background of 2008 being one of the best years of the market. The trend that the market went through in 2009 resulted from the effect of the global financial crisis which began to be felt in the fourth quarter of 2008 and the fact that in 2009, the Exchange also effectively began migrating from paper certification to electronic book entry securities under the new automated Trading System. That process naturally requires time since investors needed to be convinced to get on board.

Interest rate changes are broadly recognized as a major source of uncertainty for corporations. According to Graham and Harvey (2001), interest rate risk is perceived as the second most important risk factor, only behind market risk. Financial theory states that movements in interest rates affect both the firm‟s expectations about future corporate cash flows and the discount rate employed to value these cash flows and, hence, the value of firm. The impact of interest rate fluctuations on the market value of companies has received a great deal of attention in literature, although much of the empirical research has focused on financial institutions because of the particularly interest rate sensitive nature of the banking business (Flannery and James, 1984; Staikouras, 2003 and 2006; Hahm, 2004). Nevertheless, interest rate variations may also exert a significant influence on nonfinancial corporations, principally through their effect on the financing costs and the value of financial assets and liabilities held by these firms (Bartram, 2002).

The liaison between stock prices and interest rate variables has been extensively investigated in the literature of financial economics. The nexus between interest rate and stock price has received attention of researchers from a wide range of areas such as assets pricing and testing

stock market efficiency etc. The issue of whether stock prices and interest rate are related or not, has a significant bearing on increased international trade and the integration of the global financial markets. Impact of interest rate on the stock prices of firms is an important episode to investors and regulatory authorities. Investors respond to the decisions of regulatory authorities on monetary policy when regulatory authorities change interest rate to control money supply because the required rate of return on financial assets get affected due to changes in interest rate.

If stock prices and interest rates are associated and the causation runs from interest rates to stock prices then crises in the stock markets can be prohibited by controlling the interest rates. Moreover, developing countries can utilize such an association to attract foreign portfolio investment in their own countries. In the same way, if the causation runs from stock prices to interest rates, then authorities can focus on domestic economic policies to stabilize the stock market.

In Ghana, interest rates decisions are taken by the Monetary Policy Committee of the Bank of Ghana. The official interest rate is the Monetary Policy Rate (MPR). The fundamental principle for the relationship between interest rate and stock market returns is that stock prices and interest rates are negatively correlated. Higher interest rate resulting from tightening monetary policy usually has negative effects on stock market returns. This is due to the fact that higher interest rate reduces the value of equity as indicated by the dividend discount model and consequently, makes fixed income securities more attractive as an alternative to holding stocks.

As a result, this may reduce the propensity of investors to borrow and invest in stocks and also, raises the cost of doing business and hence affects profit margin. On the other hand, lower

interest rates resulting from expansionary monetary policy also boost stock market. Furthermore, as concluded by Hashemzadeh and Taylor (1988), a decline in interest rates also leads to an increase in the present value of future dividends.

1.2 Statement of problem

The stock price of firms varies significantly with the changes in financial risk. Consequently, researchers and investors pay increasing attention to interest rate exposure in the Ghana stock exchange market. Interest rate fluctuations influence both multinationals and domestic firms,, competitive positions, their input and output price, their supply and demand chains, or their competitor,,s prices. Therefore, it is important to explore how interest rate affects stock prices and this will help investors and policy makers in their decision making.

In 2008, interest rate (IR) was 13.5% and by the end of the first quarter it had increased to 14.3%. The IR continued to rise further to 16% by the end of the second quarter of 2008. However the last half of the year 2008 saw the IR of 17%. In 2009, interest rate was 17%. This went up to 18.5% by the end of the first quarter.

Many studies have investigated the relationship between interest rate and stock prices. Zordan (2005) shows that stock prices and interest rates are inversely correlated, with cycle's observable well back into the 1880's; more relevant to the period subsequent to World War II. From the late 1940's to the mid 1960's, inflation was low, and interest rates were both low and stable. Stocks did well during this period, both in nominal and real terms. The inverse relationship between interest-sensitive asset classes like stocks, bonds, and real estate and commodity prices has been known through history.

Jefferis and Okeahalam (2000) worked on South Africa, Botswana and Zimbabwe stock market, where higher interest rates are hypothesized to depress stock prices through the substitution effect (interest bearing assets turn out to be more attractive relative to shares), an

increase in the discount rate (and hence a reduced present value of future expected returns), or a depressing effect on investment and thus on expected future profits.

From the studies above, it is obvious that in some countries there is an inverse relationship between interest rate and stock prices but these countries including as US, Germany and South Africa are industrialized countries and their conclusions on the relationship between interest rate and stock prices cannot be used as a yardstick in the case of Ghana which is a now-developing economy.

There is therefore a knowledge gap and this thesis proposes to fill this gap.

1.3 Objective of the Study

The major objective of the study is to investigate how the share prices of companies listed on the GSE fare against volatility in Interest rate.

The specific objectives of the study are;

i. To find the relationship between Interest Rate and Stock Prices ii. To examine the impact of interest rate, money supply and inflation on stock prices iii. To determine the direction of causality between stock prices and interest rate.

1.4 Hypothesis of the Study

The study sets the following hypothesis:

H_0: There is no causal relationship between Interest Rate and Stock Prices

H_1: There is a causal relationship between Interest Rate and Stock prices

1.5 Significance of the Study

There have been many empirical investigations, analyses and studies in relation to how macro-economic variables contribute to the changes in stock prices and how these factors affect the stock market index. This thesis will examine the relationship between interest rate and stock prices: an empirical study on Ghanaian listed firms. This thesis will examine each variable and analyze its impact on stock prices in order to acquire a better understanding of the situation. This study is also an opportunity to highlight the importance of macroeconomic factors and how significant they are in the marketplace. It will enlighten decisionmakers or regulatory authorities on how best to rebuild confidence in the market. The unpredictability of trends in the Ghanaian stock prices are unprecedented, hence my compelling interest to fully investigate, document and explain these trends, while underlining the opportunities apparent in the reordering of economic priorities and the opportunities for the investors in the market to learn how to make intelligent investment engagements and decisions. In addition to being useful as a source of information, it may also arouse interest for further studies in this or related areas concerning the activities of both foreign and local investors.

1.6 Scope and Limitation of the Study

Obtaining and collating data for the research was one of the mitigating factors for this research; monthly data on Interest rate and Stock Market Index from January 2000 to September 2010 was used and this may not reflect the whole effects of interest rate on the stock prices since the data is limited to the year 2010 and above and not from the inception of the GSE.

1.7 Organization of the study

The study consists of five chapters as follows: Chapter one is the introduction and comprises the background of the study, statement of the problem, objectives of the study, significance of the study, scope and limitation of the study and the organization of the study. Chapter two

presents a review of the relevant literature on interest rate and stock prices. Chapter three gives detail research methodology. It delineates the sources of data, and empirical design. Chapter four discusses and analyses the results from the estimation of the data. Chapter five presents the findings and offers conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter is in two main sections; the first section presents the theoretical review of related literature on the subject matter under study. The second section looks at empirical works on the relationship between interest rates and stock prices.

2.1 Theoretical Review

The study of (Hamrita & Abdelkader, 2011) has explained that, interest rate and stock prices have a negative correlation. This is because an increase in interest rate reduces the present value of future dividend‟s income, which should depress stock prices. On the other hand, low interest rates result in a lower opportunity cost of borrowing. Lower interest rates inspire investments and economic activities, which would cause prices to rise.

The perception concerning the relationship between interest rates and stock prices is well documented which recommends that an increase in interest rates increases the opportunity cost of holding money and thus substitution between stocks and interest bearing securities and hence falling stock prices. Increase in interest rate would increase the cost of borrowing which would negatively affect the future cash flows and also capacity of the firms to borrow. With increase in cost of borrowing, projects with lower internal rate of returns will be rejected. This means that not only the current net income will be affected, but also the future cash flows will be lower compared to otherwise. Resultantly, higher interest rates will lead to lowers stock prices. Thus, a change in nominal interest rates should move asset prices in the opposite direction.

Prudent investors constantly intend to invest in an efficient market. But, in an inefficient market, hardly are people capable of generating extra ordinary profit resulting in losses of confidence

of general people about the market. In that situation, if the rate of interest paid by banks to depositors boosts up, people switch over their investible fund from share market to bank causing decrease in the demand of share. This will ultimately decrease the price of share and vice versa. In the same fashion, when rate of interest paid by banks to depositors raises, the lending interest rate also increases which leads to decrease the investments in the economy as a whole which is also an additional rationale for declining share price and vice versa.

Consequently, there exists inverse relationship between share price and interest rate. If stock prices and interest rates are associated and the causation runs from interest rates to stock prices then crises in the stock markets can be prohibited by controlling interest rates. Moreover, developing countries can utilize such an association to attract foreign portfolio investment in their own countries. In the same way, if the causation runs from stock prices to interest rates, then authorities can focus on domestic economic policies to stabilize the stock market. The capital asset pricing model (CAPM) and the Arbitrage pricing theory (APT) are the two main general theory of asset pricing.

In finance, arbitrage pricing theory (APT) is a general theory of asset pricing that holds that the expected return of a financial asset can be modeled as a linear function of various macroeconomic factors or theoretical market indices, where sensitivity to changes in each factor is represented by a factor-specific beta coefficient. The model-derived rate of return will then be used to price the asset correctly - the asset price should equal the expected end of period price discounted at the rate implied by the model. If the price diverges, arbitrage should bring it back into line. The theory was proposed by Stephen Ross in 1976.

Under the APT, an asset is mispriced if its current price diverges from the price predicted by the model. The asset price today should equal the sum of all future cash flows discounted at the

APT rate, where the expected return of the asset is a linear function of various factors, and sensitivity to changes in each factor is represented by a factor-specific coefficient. A correctly priced asset here may be in fact a synthetic asset - a portfolio consisting of other correctly priced assets. This portfolio has the same exposure to each of the macroeconomic factors as the mispriced asset.

Arbitrage pricing theory (APT) has been extensively used in studies analyzing the relationship between stock market and macroeconomic indicators. An early theory of arbitrage pricing uses a functional form to test the relationship between stock index and macroeconomic variables. All individual stocks are affected by common factors. Market index can be affected by macroeconomic variables, such as changes in interest rate, money supply, economic growth, and inflation. However, the APT model has a drawback as it assumes the constant term to be a risk-free rate of return (Brahmasrene and Jiranyakul, 2007).

The capital asset pricing model (CAPM) is used to calculate the required rate of return for any risky asset. Your required rate of return is the increase in value you should expect to see based on the inherent risk level of the asset. As an analyst, you could use CAPM to decide what price you should pay for a particular stock. If Stock A is riskier than Stock B, the price of Stock A should be lower to compensate investors for taking on the increased risk.

CAPM is most often used to determine what the fair price of an investment should be. When you calculate the risky asset's rate of return using CAPM, that rate can then be used to discount the investment's future cash flows to their present value and thus arrive at the investment's fair value. By extension, once you've calculated the investment's fair value, you can then compare it to its market price. If your price estimate is higher than the market's, you could consider the stock a bargain. If your price estimate is lower, you could consider the stock to be overvalued.

The APT along with the capital asset pricing model (CAPM) is one of two influential theories on asset pricing. The APT differs from the CAPM in that it is less restrictive in its assumptions. It allows for an explanatory (as opposed to statistical) model of asset returns. It assumes that each investor will hold a unique portfolio with its own particular array of betas, as opposed to the identical "market portfolio". In some ways, the CAPM can be considered a "special case" of the APT in that the securities market line represents a single-factor model of the asset price, where beta is exposed to changes in value of the market.

Additionally, the APT can be seen as a "supply-side" model, since its beta coefficients reflect the sensitivity of the underlying asset to economic factors. Thus, factor shocks would cause structural changes in assets' expected returns, or in the case of stocks, in firms' profitability. On the other side, the capital asset pricing model is considered a "demand side" model. Its results, although similar to those of the APT, arise from a maximization problem of each investor's utility function, and from the resulting market equilibrium (investors are considered to be the "consumers" of the assets).

Another theory of asset pricing is the Modern portfolio theory (MPT) which is based on the idea of efficient markets. The underlying philosophy of this investment theory is that all investors in the market place are intelligent, profit-oriented and are trying to find mispriced stocks. The large number of informed participants will ultimately drive a stock price to its intrinsic value and hence create an efficient market. In such an environment mispriced stocks would be detected immediately, the under- or overvaluation would disappear and no profit could be gained from using any form of investment analysis. In other words, the MPT states that all stocks are priced fairly and nobody can persistently outperform the market. Consequently, followers of this method of investing will try to reduce risk by diversification and costs by minimizing transaction fees and taxes. The six optimal investment strategies is the

creation of an efficient portfolio based on covariances of all the stocks in the global marketplace. In praxis however, this strategy usually means investing in index funds.

2.2 Empirical Literature Review

Hamrita and Abdelkader (2011) examined the multi-scale relationship between interest rate, exchange rate and stock price using a wavelet transform in US over the period from January 1990 to December 2008. The exchange rate returns and stock index returns were found to have a bidirectional relationship in this period at longer horizons.

Czaja et al; (2010) investigated whether or not interest rate risk is priced in the German stock market. Constructing benchmark portfolio of stocks having same risk exposure, they studied time series returns of the benchmark portfolio. They found a significant difference between the benchmark returns and stock returns in different industries. Disregarding the indusrty association, their findings suggests that investors should receive positive reward when exposed to interest rate risk. They also found that the benchmark returns of financial institutions were greater than the benchmark returns of non-financial institutions. It means stocks of financial institutions bear more interest rate risk than stocks of non-financial institutions.

Harasty and Roulet (2000) worked on 17 developed countries and showed that stock prices are co-integrated with earnings (a proxy for dividends) and the long-term interest rate in each country (except the Italian market for which the short-term interest rate was used).

Using Granger causality and monthly data, Abdalla and Murinde (1996) investigate the relationships between exchange rates and stock prices in India, Korea, Pakistan, and the Philippines. They find a unidirectional causality from exchange rates to stock prices in all countries except the Philippines, where stock prices Granger cause stock prices.

Tessaromatis (2003) observes the behavior of nominal and real interest rates and monthly total return of 35 industry indices and 10 sector indices as well as four financial times indices in UK. Results of the linear regressions reveal that interest rate movements are important determinants of equity return variability and all the industries other than forestry and paper, sectors and market portfolios are negatively related to interest rate changes. Utilities have the highest sensitivity to movements in nominal interest rates because of their high exposure to inflation. Statistical outputs conclude that there are significant differences between interest rate and inflation sensitivities across all economic sectors.

Patra and Poshakwale (2006) examined the short-run dynamic adjustments and the long-run equilibrium relationships between selected macro-economic variables, trading volume and stock returns in the Greek stock market during the period of 1990 to1999. They reach results showing that short run and long run equilibrium relationship exists between inflation, money supply and trading volume and the stock prices in the Athens stock exchange. No short run or long run equilibrium relationship is found between the exchange rates and stock prices.

Using the arbitrage pricing theory (APT) on Japanese Stock returns and several macroeconomic variables like industrial production, money supply crude oil price, short term interest rates), it was discovered by Elton and Gruber (1988) that there exists a positive relationship between stock prices and short-term interest rates.

Chen et al. (1989) examine the effect of discount rate changes on the volatility of stock prices and on trading volume. The authors discovered that unexpected discount rate changes contributed to higher, though short-lived, volatility in trading volume.

Mok (1993) verified the causality of daily interest rate, exchange rate and stock prices in Hong Kong for the period from 1986 to 1991. The results indicate that the HIBOR (Hong Kong Inter Bank Offered Rate) and the price indices are independent series. As a further extension to

the study the relationship between exchange rate and stock price was examined, the research concluded that those series are also independent.

It was unearthed by Smirlock and Yawitz (1985) that interest rate changes can impact on equity prices in two ways i.e. by affecting the rate at which the firm‟s expected future cash flows will be capitalized, and by altering expectations about future cash flows. They discovered that an increase in interest rates causes stock prices to decline and a decline in interest rates causes stock prices to rise. Further, they conclude that if both capitalization rates and expectations about future cash flows are impacted by interest rates, these effects would influence equity prices.

Goswami and Jung (1997) in their study on the effects of economic factors on Korean stock market employed the VECM to verify the SR and LR relationship between stock price and nine macroeconomic variables namely; SR-IR, LR-IR, Inflation, money supply, industrial production, oil price, balance of trade for current account and foreign exchange from two different currencies i.e. Korean won per USD and Korean won per Japanese Yen. The authors conclude that the Korean Stock prices are positively related to industrial production, inflation and SR interest rate.

Amaresh Das (2005) documents a paper to investigate interrelationship between the stock prices represented by market index and interest rates measured by three months Treasury bills for monthly observations from January 1985 to January 2003 sampling three Asian countries including Bangladesh. Codependence among variables shows that the relationship between stock prices and interest rate is not significant for Bangladesh and Pakistan except India. Results further suggest that the time series data for Bangladesh and Pakistan reflects strongly common cycles.

Hasan and Samarakoon (2000) studied the ability of interest rates, as measured by the treasury bill rates of three maturities; 3, 6 and 12 months, to track the expected monthly, quarterly and annual returns in the Sri Lankan stock market for the period 1990-1997. Stock return is measured by the continuously compounded monthly returns on the ASPI and Sensitive price index. Results of the Ordinary Least Squares suggest that the short-term interest rates are positively related to future returns and they are able to reliably track expected returns horizons. It further suggests that the 12 months maturity is the most powerful tool to track monthly and quarterly expected return among all three maturities.

Uddin and Alam (2007) examines the linear relationship between share price and interest rate, share price and changes of interest rate, changes of share price and interest rate, and changes of share price and changes of interest rate on Dhaka Stock Exchange (DSE). For all of the cases, included and excluded outlier, it was found that Interest Rate has significant negative relationship with Share Price and Changes of Interest Rate has significant negative relationship with changes of share price.

Alam & Uddin (2009) examined relationship among interest rate and stock prices of developed and developing countries and found that none of the markets follow random walk. They found a significant negative relationship among interest rate and stock prices of all countries. They concluded that these countries can improve performance of their stock exchanges by controlling interest rate considerably.

Arango (2002) found that some evidence of the nonlinear and inverse relationship between the share prices on the Bogota stock market and the interest rate as measured by the inter bank loan interest rate, which is to some extent affected by monetary policy. The model captures the stylized fact on this market of high dependence of returns in short periods. These findings do not support any efficiency on the main stock market in Colombia.

In a study conducted by Lobo (2002) which examines the impact of unexpected changes in the federal funds target on stock prices from 1988 to 2001; Measures of interest rate surprises are constructed from survey data and changes in the 3-month T-bill yield. It was discovered that surprises associated with decreases in the target cause stock prices to rise significantly. Surprises associated with increases in the target increase stock market volatility on the announcement day, with volatility reverting to pre-surprise levels on the day after the announcement. This volatility pattern is only evident since 1994. An implication is that concerns about immediate disclosure causing persistent and heightened stock market volatility might be misplaced.

Jefferis and Okeahalam (2000) worked on South Africa, Botswana and Zimbabwe stock market, where higher interest rates are hypothesized to depress stock prices through the substitution effect (interest-bearing assets become more attractive relative to shares), an increase in the discount rate (and hence a reduced present value of future expected returns), or a depressing effect on investment and hence on expected future profits.

Lee (1997) used three-year rolling regressions to analyze the relationship between the stock market and the short-term interest rate. He tried to forecast excess returns (i.e. the differential between stock market returns and the risk-free short-run interest rate) on the Standard and Poor 500 index with the short-term interest rate, but found that the relationship is not stable over time. It gradually changes from a significantly negative to no relationship, or even a positive although insignificant relationship

Trivoli (1991) found that the US current stock price is positively correlated with the previous month‟s stock price, money supply, recent federal debt, recent taxexempt government debt, long-term unemployment, the broad money supply and the federal rate. However, there was a

negative relationship between stock prices and the Treasury bill rate, the intermediate lagged Treasury bond rate, the longer lagged federal debt, and the recent monetary base.

Nishat (2004) analyze the long-term relationship between macroeconomic variables and stock prices of Karachi stock exchange using a unit root technique. He found a causal relationship between the stock price and the macroeconomic variables.

Zhou (1996) also studied the relationship between interest rates and stock prices using regression analysis. He found that interest rates have an important impact on stock returns, especially on long horizons, but the hypothesis that expected stock returns move one-for-one with ex ante interest rates is rejected. In addition, his results show that long-term interest rate explain a major part of the variation in price-dividend ratios and suggests that the high volatility of the stock market is related to the high volatility of long-term bond yields and may be accounted for by changing forecasts of discount rates.

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Zordan (2005) said that historical evidence illustrates that stock prices and interest rates are inversely correlated, with cycle‟s observable well back into the 1880‟s; more relevant to the period subsequent to World War II. From the late 1940‟s to the mid 1960‟s, inflation was low, and interest rates were both low and stable. Stocks did well during this period, both in nominal and real terms. The inverse relationship between interest-sensitive asset classes like stocks, bonds, and real estate and commodity prices has been known through history. That relationship

can be observed in the 1877 to 1906 cycle, the 1906 to 1920 cycle, the 1920 to 1929 cycle, the 1929 to 1949 cycle, and the 1949 to 1966 cycle.

Using Johansen"s multivariate cointegration test and Innovation accounting techniques, Adam and Twenenboah (2008) examined the role of macroeconomic variables on stock price movement in Ghana by means of Databank Stock Index, Treasury Bill Rate, Consumer Price Index and Exchange Rate as macroeconomic variables and conclude that there is cointegration between macroeconomic variables identified and stock prices in Ghana indicating a long run relationship.

It is evident that macroeconomic variables such as Interest Rate, Treasury bill rate, Money Supply, Exchange Rate, Foreign Direct Investments (FDIs), Consumer Price Index (CPI) etc. have some impact on share price on Stock Exchange Markets in both developed and developing countries where studies have been conducted. It is expected that these findings would also be applicable in Ghana and would be tested accordingly.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter deals with the modeling techniques used to achieve the major objectives of this study. It comprises five sections. Section one provides the sources of data used for the study. The second section focuses on the specification of the model used for the study. Section three discusses how the variables used for the study were defined as well as the expected impact of the determinants. Section four looks at the test of stationarity of the time series variables.

Section five deals with estimating causality between the variables using Granger Causality test and finally using least square estimation technique for the regression analysis.

3.2 Sources of Data

The study used time series data which spans from January 2000 to September, 2010 a total of one hundred and twenty nine (129) months for the model employed in this study. Data on stock price (proxied by all-share index), interest rate proxied for 91 days treasury bills, the level of money supply (M2), and inflation rates were all obtained from the Bank of Ghana.

3.3 Model Specification

Following Khan et al., (2012) stock return is dependent on interest rate, the level of money supply (M2), and inflation, the study has modified this multiple regression by replacing the stock return with stock price as given as follows:

$$LNSP_t = f(LNINTR_t, LNM2_t, LNINFL_t) \quad (1)$$

$$LNSP_t = \beta_0 + \beta_1 LNINTR_t + \beta_2 LNM2_t + \beta_3 LNINFL_t + \varepsilon_t \quad (2)$$

SP denotes the stock price at time t, INTR represents interest rate as measured by 91 days treasury bills during the time period t, M2 is the level of money supply and INFL is the inflation rate at the time t. β_i is the drifting components, whereas ε_t indicates the error term and the LN is natural logarithm which helps to estimate the βs in percentage change and also helps reduce heteroscedasticity (Gujarati, 2005).

3.4 Description of Variables and Their Expected Signs

3.4.1 Interest Rate

Interest rate (as proxied by 91 days treasury bill) is the price a borrower pays for the use of money they borrow from a lender/financial institutions or fee paid on borrowed assets (Crowley, 2007). Interest can be thought of as "rent of money". Interest rates are fundamental to a „capitalist society" and are normally expressed as a percentage rate over the period of one year. The opportunity cost for investing in a stock is represented by the interest rate. Interest rate is known as one of the most important factor moving the attitude of investors in the stock market. As interests rises bonds turn out to be more attractive given their risk-return features; this encourages investors to switch from the stock market to the money market by buying bonds and selling stocks, hence depressing stock prices. Accordingly, interest rate is expected to have an inverse effect on stock price (i.e. $\beta_1 < 0$).

3.4.2 Level of Money Supply (M2)

The monetary policy stance is transmitted into the real economy by various channels such as Asset Price Channel, Interest Rate Channel, Exchange Rate Channel and Credit Channel. All of these channels indeed affect stock prices directly or indirectly. Tobin (1969), quoted in Mishkin (2004 p. 84) hypothesized that monetary policy can affect the real economy through asset price channel. Expansionary monetary policy increases household's spending capacity which, in part, is spent on stock market, increases the demand for stocks and raises stock prices. According to Keran (1971), changes in nominal money supply affect total spending and consequently affect corporate earning leading to changes in share prices. Therefore, it is expected that the level of money is positively related to stock price; that is $\beta_2 > 0$.

3.4.3 Inflation

The rate of inflation in an economy has a great impact on investors; the investors are faced with the decision as to whether to make investments or not. Increase in inflation rate can cause the real income to decline, when this happens, investors end up selling their assets, including stocks to improve their buying power. When inflation rate is low, the reverse is the case; investors would like to purchase more assets with stocks not exclusive. Ralph and Eriki (2001) conducted an empirical study on Nigerian stock market and found that a negative relationship exists between stock prices and inflation. On account of this empirical evidence, it is expected that there is a negative relationship between stock price and inflation (i.e.

$\beta_3 < 0$).

3.4.4 Stock Price

Stock price is the cost of purchasing a security on an exchange. Stock prices can be affected by a number of things including volatility in the market, current economic conditions, and popularity of the company. Stock prices change every day as a result of market forces. By this we mean that share prices change because of supply and demand. If more investors want to buy a stock (demand) than sell it (supply), then the price moves up. Conversely, if more investors wanted to sell a stock than buy it, there would be greater supply than demand, and the price would fall. Stock prices are often very tempting in an economic downturn. The low prices offered are a good deal for many investors, they just do not trust the company to improve. In this study, stock price is calculated by finding the average of the stock prices of the listed companies on Ghana Stock Exchange for a particular month during the period of the study.

3.5 Estimation Technique

Granger Causality Test

The main estimation technique for the study is the granger causality test. This is an econometric tool developed by Granger (1969) that looks at identifying causality between a set of variables. As the study sought to examine the causality between stock price and interest rate, the causality relations were checked to back up results from the estimation in equation (1). Granger causality test is used to examine the direction of the causality between stock price and the independent variables concerned. The general of causality between stock price and interest rate is given as follows:

$$Y_t = \omega_{10} + \sum_{i=1}^{M_{11}} \omega_{11} Y_{t-i} + \sum_{j=1}^{M_{12}} \omega_{12} X_{t-j} + \mu_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

$$X_t = \omega_{20} + \sum_{i=1}^{M_{21}} \omega_{21} X_{t-i} + \sum_{j=1}^{M_{22}} \omega_{22} Y_{t-j} + v_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots . (3)$$

$where\ \omega_{10}\ and\ \omega_{20}$ are the constant parameters in equation (2) and (3) respectively. The error terms u_t and $v_t$are the serially uncorrelated white noise error term with a zero mean and a constant variance. Y_t and X_t are the two variables to be measured; thus the stock price and interest rate. M_{11}, M_{12}, M_{21},and M_{22} represents the optimal lag length for the variables.

The study examine the joint significance of the lagged dynamic terms by testing the null hypothesis:

$H_0: \omega_{1i} \neq 0$, implying that the independent variable (X) does not granger-cause the dependent variable (Y), against the alterative hypothesis that

$H_1: \omega_{1i} \neq 0$, implying that the independent variable (X) granger-cause the dependent variable (Y).

If ω_{12} is found statistically significant, then Y Granger causes X and ω_{21} is realized to be meaningful, it means that X Granger causes Y.

3.6 Estimation Procedures

3.6.1 Unit Root Test

One major problem associated with time series data is their non-stationarity because they are trended. This feature of time series data results in spurious (Asteriou and Hall, 2014) regression results when series are estimated at the levels and hence lead to incorrect conclusions. In such cases, the variables used for the analyses, though may not have any interrelationship would still result in a very high R^2 and also very high values of t-ratio. Stationary series have temporary shock effects and are mean reverting whiles non – stationary series have permanent effects which there is any shock associated with that variable. The study therefore tested for the stationarity of all the variables using the Augmented Dickey Fuller (ADF) test, by using the test equation with trend and intercept as in equation (4).

$$\Delta y_t = \beta_1 + \beta_2 y_{t-1} + \alpha(t) + \sum \gamma_i \Delta y_{t-i} + \mu_t + \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

where, Δ is the first difference operator, y is the variable under consideration, β_1 is the constant term, β_2 is the coefficient being tested, α is the trend coefficient, $\sum \Upsilon i \Delta yt - i$ is the summation of all past values of the variable under consideration which is being employed to eliminate the effect of autocorrelation with Υ_i being the coefficient and „u_t" is the error term.

3.6.2 Regression Analysis

According to Hair et al., (1995), regression analysis is a statistical approach that is employed to analyze the relationship between a dependent variable and one or more independent variables. A multiple regression analysis provides an equation to predict the magnitude of the dependent variable, providing values for the independent variables that explain the largest proportion of variation in the dependent variable. The linear multiple regression is used to

estimate the effect of the independent variables on the dependent variable. One significant aspect of a linear multiple regression model is that both the levels and first difference variables of variables that are stationary at first difference may be included in the regression. As a result, the natural logarithm of the first difference variables measures the growth rates of such variables in the regression.

Generally, the equation of the linear multiple regression analysis is written as follows:

$$Y_t' = \omega_0 + \alpha_1 X_1 + \alpha_2 X_2 + \cdots + \alpha_n X_n \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

where Y_t' represents the predicted value of the dependent variable; ω_0 is the value of the dependent variable when all the independent variables are held constant, that is the Y_t intercept;α represents the regression coefficient; and theXs are the independent variables.

The Pearson coefficient of determination, or simply "R-squared" in terms of computer output, is usually used to gauge this explained variation. An "R- squared" of „0" indicates that there is no relationship between the independent variables and the dependent variable. This "R-squared" tells the researcher about the perfectness of the multiple regression model and also how well the independent variables included in the model explain the dependent variable.

The significance of "R-squared" can be tested through the „F" statistics and its associated probability. The „F" statistics is a test of the null hypothesis that there is no linear relationship between the dependent and independent variables that is „R" squared equals to 0.0 (Hair et al., 1995). The null hypothesis can be rejected if the „F" statistics is high and the level of significance is close to zero. This rejection of the null hypothesis suggests the acceptance of an alternative hypothesis that there is a linear relationship between the dependent and independent variables.

CHAPTER FOUR

EMPIRICAL RESULTS AND ANALYSIS

4.1 Introduction

This chapter deals with the results and discussion of the empirical model in chapter three of the study. This chapter is divided into various sections. The chapter first presents various statistical procedures and diagnostic checks such as descriptive statistics, stationarity, least square estimation and correlation matrix. Lastly Granger causality test results are presented and analysed.

4.2 Descriptive Statistics

The descriptive statistics of the variables used in this study are presented In Table 4.1

Table 4.1: Descriptive Statistics

	LNSP	LNINFL	LNM2	LNINTR
Mean	8.123764	5.105252	7.605209	2.992728
Median	8.511839	5.192957	7.631771	2.985682
Maximum	9.295674	5.945421	9.066688	3.850148
Minimum	6.606245	3.922369	5.973555	2.261763
Std. Dev.	0.870914	0.537145	0.914223	0.492676
Skewness	-0.556121	-0.315163	-0.154727	0.010548
Kurtosis	1.742294	2.160725	1.889389	1.817634
Jarque-Bera	15.15164	5.921605	7.144545	7.516581
Probability	0.000513	0.051777	0.028092	0.023324
Sum	1047.966	658.5775	981.0720	386.0619
Sum Sq. Dev.	97.08680	36.93119	106.9828	31.06943
Observations	129	129	129	129

Source: Author"s computation using Eviews 9.

Table 4.1 above shows the descriptive statistics of the series. There are 129 observations representing the monthly data points from 2000 to 2010. Stock price, inflation, money supply, and the interest rate exhibit normality as indicated by the Jarque-Bera test and the corresponding probability values which are less than 5%. With the exception of the interest rate, all the series such as stock price, inflation and money supply are negatively skewed. The Standard Deviation of the variables indicates variation or deviation of the series from their mean values. All the series show little deviation from the mean values. This is because the extent of deviation from the mean value is not substantial for stock price, inflation, money supply, and interest rate. Stock price as proxied by all-shares index average around 8.12% over the 2000-2010 period while the period the rate of inflation also average around 5.11% over the same period. The level of money supply (M2) average around 7.61% over the 20002010 period while the interest rate proxied by 91 days treasure bill averaged 2.99% over the same period. Other statistics such as the median, maximum and minimum values as well as kurtosis are displayed in Table 4.1.

4.2 Test for Stationarity

In accordance with the dictates of the methodology, the study employed the Augmented Dickey Fuller test to identify the order of stationary among the variables in the study so as to avoid spurious regressions which makes inferences irrelevant. Table 4.2 shows the results of the ADF unit root test.

Table 4.2: Results for Unit Root Test

VARIABLES	ADF LEVELS		STATIONARITY STATUS
	INTERCEPT	INTERCEPT+ TREND	

LNSP	-1.880374	-2.193710	-
LNINFL	-4.121604***	-4.197079***	I(0)
LNM2	-1.368574	-1.987065	-
LNINTR	-1.414161	-1.722133	-
VARIABLES	**ADF FIRST DIFFERENCE**		**STATIONARITY STATUS**
	INTERCEPT	**INTERCEPT +TREND**	
LNSP	-2.800434*	-2.942167	I(1)
LNM2	-2.686021*	-2.944751	I(1)
LNINTR	-6.846528***	-6.820190***	I(1)

Note: (***) and (*) denote the rejection of the null hypothesis of unit root at the 1% and 10% significant levels.

Source: Author‟ computation using Eviews 9.

From table 4.2, the results disclosed that inflation was stationary at levels and was statistically significant at 1% level hence integrated of order zero. That is I (0). However stock price, money supply and interest rate were non-stationary in their levels. As a result, there is the need to test for their stationarity using the differencing approach. The results, showed that stock price, money supply and the interest rate became stationary at the first difference hence integrated of order one. That is I (1). This means that the stationary series have temporary shock effects and that any regression with stationary series helps to avoid spurious regressions which makes inferences irrelevant.

4.3 OLS Estimation Results

The ordinary least squares estimator was used to determine the effect of inflation, interest rate and money supply on stock prices. The regression model includes both the level and first

difference variables of series that were stationary at the first difference. The natural logarithm of first difference variables measured the growth rates. Table 4.3 presents the results of the OLS regression.

Table 4.3 OLS Estimation Results

Dependent Variable: LNSP
Method: Least Squares (Gauss-Newton / Marquardt steps)
Sample (adjusted): 2000M02 2010M09
Included observations: 128 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
Constant	2.850818	0.683714	4.169604	0.0001
LNINFL	1.172963	0.564397	2.078259	0.0398
LNINTR	-0.362119	0.084494	-4.285752	0.0000
LNM2	0.049954	0.329918	0.151414	0.8799
DLNSP	0.352167	0.499183	0.705485	0.4819
DLNINTR	1.097254	0.451403	2.430762	0.0165
DLNM2	-0.421631	0.907365	-0.464677	0.6430
R-squared	0.839684	Prob(F-statistic)		0.000000
Adjusted R-squared	0.831734	Durbin-Watson stat		0.075371
F-statistic	105.6262			

Source: Author's computation using Eviews 9

From table 4.3, inflation has a positive and significant impact on stock price. As a result, a proportionate increase in inflation would lead to a more than proportionate increase in stock price by about 1.17%. This result is significant at 5% significant level. There is a belief that stocks might prove to be a good hedge against inflation (Fama and Schwert, 1977), since stocks represent claims to real asset. Moreover, stocks are widely assumed to be an attractive investment in an inflationary environment, because they are based on real assets. If rates of return on common stocks move directly with the rate of inflation, investors would be fully compensated for the erosion in purchasing power. This is because common stocks represent a

claim to real resources and their value would increase with inflation. However, the results does not meet a prior expectation and also contradict the findings of Khan et al., (2012) and Zhao (1999) but a positive impact on inflation on stock prices is also possible (Fama and Schwert, 1977; Adam and Twenenboah, 2008).

The study further revealed that there exists a negative but insignificant relationship between the level of money supply and stock price. The level of money supply has a coefficient of 0.049954 which proposes an increase in the level of the stock price of about 0.05% for a proportionate increase in the level of money supply. The positive relationship between money supply and stock price supports the Monetary Portfolio Hypothesis (Friedman, 1988) which expects that an increase in money supply will result in an increase in almost all economic activities including the stock market.

Furthermore, there exist negative and significant effects of interest rate on stock prices such that a proportionate increase in interest rate would lead to a less than proportionate fall in stock prices by about 0.36%. This is because a rise in interest rates raises equity capitalization rates, which also leads to lowering stock prices. Interest rate is known as one of the most important factor moving the attitude of investors in the stock market and serve as the opportunity cost for investing in a stock market. As interests rises bonds turn out to be more attractive given their risk-return features; this encourages investors to switch from the stock market to the money market by buying bonds and selling stocks, hence depressing stock prices. When interest rate is reduced, this encourages demand for cash for tentative purpose which may improve the stock market activities. The results confirmed studies by Jefferis and Okeahalam (2000), Uddin and Alam (2007), Crowley (2007), Zordan (2005), Abugri (2008), Adam and Twenenboah (2008). On the other hand, the growth rate of interest rate has a positive and significant effect on stock

prices in Ghana with a coefficient of 1.097254. This result is in support of the findings of Lee (1997), Hasan and Samarakoon (2000) and Khan (2012).

The study also found a negative but insignificant effect of the growth rate of stock prices on current stock prices. Hence the growth rate of stock price does not affect current stock prices in Ghana. This is also confirmed in the works of Positive Trivoli (1991), Uddin and Alam (2007), and Adam and Twenenboah (2008).

Again, given the results in Table 4.3, the stock price is likely to increase by 3% when all other variables are held constant and it is significant at 1%. This implies that, the stock price depends on certain variables that must positively influence the stock market prices in Ghana.

Finally from the OLS regression results, the signs of the parameters of the model did not exhibit considerable level of consistency with the exception of interest rate that retained its sign. However, the estimation procedure showed very good result as the R-Square is 83.96% and the R-Bar- Squared is also 83.17%. The R- Square means that over 83.96% of all variations in the stock prices are explained by all the independent variables. The F statistic also proved that all the independent variables are significant at 1%. This means that the explanatory variables do actually have significant influence on the dependent variable. The DW statistic of 0.075371 is evidence enough to dismiss the notion of autocorrelation in the function.

4.4 Correlation Matrix

In order to lend more support to the regression analyses by way of attesting to the existence of inter-relationship between the variables, Table 4.4 shows correlation between the variables. The table indicates that there is a strong relationship ($r = 0.899$; $P < 0.01$) between stock price and inflation. The relationship is also significantly positive indicating that a 0.01 increase in

inflation will lead to 0.899 increases in the stock price. Table 4.4 also portrays a positive significant relationship (r = 0.898) between stock price and the level of money supply. Finally, is the sort of relationship that exists between stock price and interest rate. The study found that there exist moderately significant negative relationship (r = -0.695; P < 0.01) between stock price and interest rate. This implies that a decline in interest rate has a deleterious effect on stock prices. This is not quite surprising because as it is observed empirically, there is always a strong negative relationship between the two variables.

Table 4.4: Correlation Matrix

	LNINFL	LNSP	LM2	LNINTR
LNINFL	1.000			
LNSP	0.899**	1.000		
LNM2	0.993**	0.898**	1.000	
LNINTR	-0.640**	-0.695**	-0.645**	1.000

Note: ** indicates that correlation is significant at the 0.01 level

Source: Author"s construct

4.5 Granger Causality

To determine the direction of causality between stock price and interest rate, the Pairwise Granger Causality test was used. It was appropriate to use the Pairwise Granger Causality test since both stock prices and interest rate are integrated of orders one [I(1)].

Table 4.5: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
LNINTR does not Granger Cause LNSP	128	4.53135	0.0352
LNSP does not Granger Cause LNINTR		0.03779	0.8462

Source: Author"s computation using Eviews 9

The granger causality tests are presented in Table 4.5 above. The test results reveal that there is unidirectional causality between interest rate and stock price. The null hypothesis that interest rate does not granger cause stock price is rejected at 5% significant level but the null hypothesis of stock price not granger causing interest rate is not rejected at neither 5% nor 10% level of significance. This means that, changes in the stock price is explained by the variations in the interest rate. Hence interest rate serve as a better predictor of changes in the stock prices. This result confirmed studies by Nishat (2004).

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND POLICY RECOMMENDATIONS

5.0 Introduction

The chapter is the concluding part of the whole study. It summarizes the major findings that were revealed in the study. Furthermore, it provides some policy recommendations based on the findings and their corresponding implications.

5.1 Summary of findings

The main findings of the study are that stock price average around 8.12% over the 2000-2010 periods while the period the rate of inflation also average around 5.11% over the same period. The level of money supply (M2) average around 7.61% over the 2000-2010 period while the interest rate proxied by 91 days treasure bill averaged 2.99% over the same period. Correlation between the variables considered in the study was in tandem with expectation excluding inflation. The study found that there exist moderately significant negative relationship between stock price and interest rate. As expected, there was a negative insignificant relationship between stock price and the level of money supply, and the relationship was noted to be insignificant. The prior expectation of the relationship between inflation and stock price was not confirmed as the current study revealed that there is a strong positive relationship between stock price and inflation.

The regression analysis revealed that interest rate had a significant negative effect on stock price in Ghana. The empirical result also indicated that there existed a direct relationship between inflation and stock price and it was found to be significant. Again, the level of money supply has a positive influence on stock price but it was found insignificant. The study also revealed that the growth rates of stock prices and money supply do not have significant impact on stock prices whiles the growth rate of interest rate significant affects stock prices.

As part of the study‟s objectives, the Granger causality test was used to determine the direction of causality between stock price and interest rate. The study discovered that there is unidirectional causality between interest rate and stock price as in the case of Ghana. Thus, changes in the stock price are better explained by the variations in interest rate.

5.2 Conclusion

There is a controversy among analysts and researchers in the fields of finance and economics over the relationship between the financial market and the macroeconomy. Most scholars have attempted to develop models in order to conduct empirical works that could help in deepening the understanding of the interrelationships therein. However, the global economic crises in the year 2007 was a wakeup call for scholars in these fields to work harder for a better understanding of this interrelationship. The study therefore set out to investigate the relationship between stock price and other macroeconomic variables like interest rate, inflation, and the level of money supply (M2). The empirical results indicated that interest rate had a significant negative effect on stock price in Ghana. The findings also indicated that there existed a direct relationship between inflation and stock price and it was found to be significant. Further, the study noticed that the changes in the stock price are explained by the variations in interest rate whereas the changes in stock price do not in turn influence the changes in interest rate. This means that there is unidirectional causality between interest rate and stock price as in the case of Ghana.

5.3 Policy Recommendations

Taking into account the study findings, the following recommendations are made:

Policy makers must be too careful when trying to influence on the economy through changes in macroeconomic variables such as interest rate and money supply. Whilst targeting to correct macroeconomic ills like inflation or unemployment, they might in adversely depress the stock market and curtail capital formation which itself would lead to further slowdown of the economy.

Further, for a better market performance which has the tendency of increasing investor confidence in the capital market and investment, government should put measures in place that seek to ensure a stable macro economy. Such measure should include maintenance of mild and moderate inflation and a stable interest rate enough to encourage portfolio investment.

In order to achieve better stock performance, policy makers in Ghana Stock Exchange must put in place measures to ensure better corporate performance by listed firms. This is because investors would like to know the performance of the stock market in the previous year before they decide to invest in them. It is likely the falling performance of the GSE would dampen its stock prices.

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APPENDICES APPENDIX I
RESULTS OF THE UNIT ROOT THEST

Null Hypothesis: LNSP has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey -Fuller test statistic		-1.880374	0.3406
Test critical values:	1% level	-3.483751	
	5% level	-2.884856	
	10% level	-2.579282	

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

Null Hypothesis: LNSP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey -Fuller test statistic		-2.193710	0.4885
Test critical values:	1% level	-4.033727	
	5% level	-3.446464	
	10% level	-3.148223	

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

Null Hypothesis: LNINFL has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey -Fuller test statistic		-4.121604	0.0013
Test critical values:	1% level	-3.482035	
	5% level	-2.884109	
	10% level	-2.578884	

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

Null Hypothesis: LNINFL has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey -Fuller test statistic		-4.197079	0.0060
Test critical values:	1% level	-4.031309	
	5% level	-3.445308	
	10% level	-3.147545	

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

Null Hypothesis: LNM2 has a unit root
Exogenous: Constant
Lag Length: 12 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey -Fuller test statistic		-1.368574	0.5954
Test critical values:	1% level	-3.487550	
	5% level	-2.886509	
	10% level	-2.580163	

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

Null Hypothesis: LNM2 has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 12 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey -Fuller test statistic		-1.987065	0.6019
Test critical values:	1% level	-4.039075	
	5% level	-3.449020	
	10% level	-3.149720	

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

Null Hypothesis: LNINTR has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey -Fuller test statistic		-1.414161	0.5735
Test critical values:	1% level	-3.482453	
	5% level	-2.884291	
	10% level	-2.578981	

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

Null Hypothesis: LNINTR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey -Fuller test statistic		-1.722133	0.7358
Test critical values:	1% level	-4.031899	
	5% level	-3.445590	
	10% level	-3.147710	

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

Null Hypothesis: D(LNSP) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey -Fuller test statistic		-2.800434	0.0611
Test critical values:	1% level	-3.483751	
	5% level	-2.884856	
	10% level	-2.579282	

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

Null Hypothesis: D(LNSP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey -Fuller test statistic		-2.942167	0.1531
Test critical values:	1% level	-4.033727	
	5% level	-3.446464	
	10% level	-3.148223	

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

Null Hypothesis: D(LNINFL) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey -Fuller test statistic		-8.571794	0.0000
Test critical values:	1% level	-3.482453	
	5% level	-2.884291	
	10% level	-2.578981	

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

Null Hypothesis: D(LNINFL) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey -Fuller test statistic		-9.162467	0.0000
Test critical values:	1% level	-4.031899	
	5% level	-3.445590	
	10% level	-3.147710	

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

Null Hypothesis: D(LNM2) has a unit root
Exogenous: Constant
Lag Length: 11 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey -Fuller test statistic			-2.686021	0.0795
Test critical values:	1% level	-3.487550	
	5% level	-2.886509	
	10% level	-2.580163	

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

Null Hypothesis: D(LNM2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 11 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey -Fuller test statistic			-2.944751	0.1526
Test critical values:	1% level	-4.039075	
	5% level	-3.449020	
	10% level	-3.149720	

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

Null Hypothesis: D(LNINTR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey -Fuller test statistic			-6.846528	0.0000
Test critical values:	1% level	-3.482453	
	5% level	-2.884291	
	10% level	-2.578981	

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

Null Hypothesis: D(LNINTR) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*

Augmented Dickey -Fuller test statistic		-6.820190	0.0000
Test critical values:	1% level	-4.031899	
	5% level	-3.445590	
	10% level	-3.147710	

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

Null Hypothesis: LNSP has a unit root
Exogenous: Constant
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Test critical values:	1% level	-3.482035	
	5% level	-2.884109	
	10% level	-2.578884	

Phillips-Perron test statistic -1.547316 0.5065

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

APPENDIX II

CORRELATION MATRIX

Correlations

		LNINFL	LNSP	LNM2	LNINTR
LNINFL	Pearson Correlation	1	.899**	.993**	-.640**
	Sig. (2-tailed)		.000	.000	.000
	N	129	129	129	129
LNSP	Pearson Correlation	.899**	1	.898**	-.695**
	Sig. (2-tailed)	.000		.000	.000
	N	129	129	129	129
LNM2	Pearson Correlation	.993**	.898**	1	-.645**
	Sig. (2-tailed)	.000	.000		.000
	N	129	129	129	129
LNINTR	Pearson Correlation	-.640**	-.695**	-.645**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	129	129	129	129

**. Correlation is significant at the 0.01 level (2-tailed).

III

RESULTS FOR THE REGRESSION ANALYSIS

Dependent Variable: LNSP
Method: Least Squares (Gauss-Newton / Marquardt steps)
Sample (adjusted): 2000M02 2010M09
Included observations: 128 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.

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Constant	2.850818	0.683714	4.169604	0.0001
LNINFL	1.172963	0.564397	2.078259	0.0398
LNINTR	-0.362119	0.084494	-4.285752	0.0000
LNM2	0.049954	0.329918	0.151414	0.8799
DLNSP	0.352167	0.499183	0.705485	0.4819
DLNINTR	1.097254	0.451403	2.430762	0.0165
DLNM2	-0.421631	0.907365	-0.464677	0.6430

R-squared	0.839684	Mean dependent var	8.135598
Adjusted R-squared	0.831734	S.D. dependent var	0.863860
S.E. of regression	0.354357	Akaike info criterion	0.816113
Sum squared resid	15.19386	Schwarz criterion	0.972084
Log likelihood	-45.23126	Hannan-Quinn criter.	0.879485
F-statistic	105.6262	Durbin-Watson stat	0.075371
Prob(F-statistic)	0.000000		

IV

MULTICOLLINEARITY AND HETEROSCEDASTICITY TESTS

Variance Inflation Factors
Sample: 2000M01 2010M09
Included observations: 128

Variable	Coefficient Variance
C(1)	0.467465
C(2)	0.318544
C(3)	0.007139

C(4)	0.108846
C(5)	0.249184
C(6)	0.203765
C(7)	0.823311

Heteroskedasticity Test: Breusch-Pagan-Godfrey

	0.995022		
F-statistic		Prob. F(6,121)	0.4319
Obs*R-squared	6.018555	Prob. Chi-Square(6)	0.4211
Scaled explained SS	3.744799	Prob. Chi-Square(6)	0.7112

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/17/16 Time: 21:11
Sample: 2000M02 2010M09
Included observations: 128

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.287990	0.271365	-1.061264	0.2907
LNINFL	0.189157	0.224008	0.844420	0.4001
LNINTR	0.014657	0.033535	0.437073	0.6628
LNM2	-0.078994	0.130944	-0.603265	0.5475
DLNASI	0.115989	0.198125	0.585434	0.5593
DLNINTR	-0.156682	0.179161	-0.874532	0.3836
DLNM2	-0.250217	0.360131	-0.694795	0.4885

R-squared	0.047020	Mean dependent var	0.118702
Adjusted R-squared	-0.000235	S.D. dependent var	0.140627
S.E. of regression	0.140644	Akaike info criterion	-1.032039
Sum squared resid	2.393458	Schwarz criterion	-0.876069
Log likelihood	73.05051	Hannan-Quinn criter.	-0.968668
F-statistic	0.995022	Durbin-Watson stat	0.177231
Prob(F-statistic)	0.431878		

APPENDIX

APPENDIX VI

LAG SELECTION CRITERION

VAR Lag Order Selection Criteria
Endogenous variables: LNASI LNINTR
Exogenous variables: C
Sample: 2000M01 2010M09
Included observations: 125

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-204.5999		0.093466	3.305599	3.350852	3.323983
		NA				
1	319.1230	1022.307	2.29e-05	-5.009969	-4.874210	-4.954817
2	351.2294	61.64423	1.46e-05	-5.459670	-5.233405*	-5.367751*
3	354.2428	5.689200	1.48e-05	-5.443884	-5.127113	-5.315197
4	361.8945	14.20170*	1.40e-05*	-5.502312*	-5.095035	-5.336857

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

APPENDIX VII

VAR ESTIMATION

Vector Autoregression Estimates
Sample (adjusted): 2000M03 2010M09
Included observations: 127 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	LNASI	LNINTR
		0.015984
LNSP (-1)	1.450560	
	(0.07919)	(0.09131)
	[18.3180]	[0.17506]
LNSP(-2)	-0.470409	-0.022242
	(0.07758)	(0.08946)
	[-6.06352]	[-0.24864]

LNINTR(-1)	-0.002392	1.445720
	(0.06953)	(0.08017)
	[-0.03440]	[18.0330]
LNINTR(-2)	-0.023183	-0.469871
	(0.07044)	(0.08123)
	[-0.32909]	[-5.78466]
C	0.247371	0.118492
	(0.10197)	(0.11758)
	[2.42590]	[1.00776]
		0.983143
R-squared	0.995819	
Adj. R-squared	0.995681	0.982590
Sum sq. resids	0.386438	0.513795
S.E. equation	0.056281	0.064896
F-statistic	7263.586	1778.787
Log likelihood	187.7754	169.6873
Akaike AIC	-2.878353	-2.593500
Schwarz SC	-2.766377	-2.481524
Mean dependent	8.147641	2.984236
S.D. dependent	0.856427	0.491828

Determinant resid covariance (dof adj.)	1.33 E-05
Determinant resid covariance	1.23E-05
Log likelihood	357.4681
Akaike information criterion	-5.471939
Schwarz criterion	-5.247987

APPENDIX VIII DATA USED FOR THE STUDY

Year	Month	LNINFL	LNASI	LNM2	LNINTR
2000	Jan	3.922369	6.608945	5.981414	3.531933
2000	Feb	3.956231	6.606245	5.973555	3.531933
2000	Mar	3.978185	6.637389	6.006107	3.531933
2000	Apr	4.021953	6.766422	6.016645	3.533978
2000	May	4.062338	6.700239	6.036199	3.5636
2000	Jun	4.098337	6.706618	6.059824	3.78009
2000	Jul	4.135487	6.711619	6.068888	3.821661
2000	Aug	4.179451	6.71174	6.067036	3.766072
2000	Sep	4.227709	6.751686	6.105016	3.7281
2000	Oct	4.271654	6.761341	6.124027	3.736002

2000	Nov	4.296333	6.764231	6.213808	3.737431
2000	Dec	4.323338	6.754604	6.27382	3.737431
2001	Jan	4.346658	6.753671	6.311735	3.737431
2001	Feb	4.364753	6.775594	6.316804	3.737431
2001	Mar	4.413162	6.801617	6.323642	3.799974
2001	Apr	4.438052	6.800059	6.336118	3.817273
2001	May	4.459103	6.796265	6.33983	3.840957
2001	Jun	4.473238	6.837869	6.346688	3.850148
2001	Jul	4.484583	6.931765	6.386374	3.821661
2001	Aug	4.504023	6.856041	6.420483	3.710396
2001	Sep	4.517868	6.862758	6.47851	3.613886
2001	Oct	4.530123	6.867974	6.499637	3.540379
2001	Nov	4.53871	6.86537	6.585344	3.462606
2001	Dec	4.542124	6.862653	6.668736	3.365225
2002	Jan	4.554824	6.864117	6.677461	3.277899
2002	Feb	4.556715	6.877193	6.669244	3.148453
2002	Mar	4.565597	6.925595	6.676958	3.161247
2002	Apr	4.570682	6.947937	6.683987	3.169686
2002	May	4.576668	7.032359	6.695428	3.169686
2002	Jun	4.578005	7.109634	6.724193	3.214868
2002	Jul	4.584559	7.136563	6.755187	3.222868
2002	Aug	4.615418	7.177553	6.770445	3.261935
2002	Sep	4.646504	7.178317	6.796153	3.258097
2002	Oct	4.646984	7.200276	6.87709	3.261935
2002	Nov	4.661834	7.217223	6.993107	3.261935
2002	Dec	4.692265	7.240865	7.07454	3.280911
2003	Jan	4.720283	7.268711	7.056779	3.288402
2003	Feb	4.823502	7.307202	7.065443	3.310543
2003	Mar	4.859037	7.404705	7.043946	3.363842
2003	Apr	4.868303	7.476699	7.026693	3.496508
2003	May	4.882802	7.531016	7.072422	3.511545
2003	Jun	4.878246	7.64238	7.092823	3.563883
2003	Jul	4.861362	7.747295	7.134811	3.671225
2003	Aug	4.903792	7.838186	7.129458	3.367296
2003	Sep	4.896346	7.879783	7.111431	3.321432
2003	Oct	4.919251	7.972121	7.222639	3.310543
2003	Nov	4.931592	8.10192	7.299865	3.169686
2003	Dec	4.950885	8.17566	7.396335	2.97553
2004	Jan	4.960745	8.242256	7.463019	2.809403
2004	Feb	4.977423	8.440981	7.389996	2.879198
2004	Mar	4.992471	8.642062	7.495153	2.906901
2004	Apr	5.011968	8.786304	7.394923	2.890372
2004	May	5.046002	8.791167	7.40956	2.827314
2004	Jun	5.057519	8.86013	7.442258	2.827314
2004	Jul	5.011302	8.871365	7.434316	2.827314
2004	Aug	5.069533	8.89786	7.461468	2.833213
2004	Sep	5.080161	8.853351	7.481837	2.833213
2004	Oct	5.087596	8.844033	7.545495	2.839078
2004	Nov	5.099256	8.816913	7.624619	2.839078
2004	Dec	5.111988	8.824457	7.649931	2.839078
2005	Jan	5.125154	8.837739	7.601752	2.839078
2005	Feb	5.148076	8.8154	7.611447	2.844909

2005	Mar	5.175585	8.772424	7.621097	2.844909
2005	Apr	5.186268	8.717387	7.627788	2.850707
2005	May	5.192957	8.707814	7.623446	2.850707
2005	Jun	5.205105	8.676366	7.647166	2.785011
2005	Jul	5.212215	8.521125	7.631771	2.747271
2005	Aug	5.216565	8.485145	7.69462	2.694627
2005	Sep	5.221976	8.492552	7.656432	2.624669
2005	Oct	5.230039	8.495908	7.715525	2.541602
2005	Nov	5.233779	8.474933	7.72343	2.509599
2005	Dec	5.239098	8.469892	7.778421	2.433613
2006	Jan	5.252273	8.453785	7.78622	2.431857
2006	Feb	5.274025	8.461723	7.801678	2.331173
2006	Mar	5.286751	8.468864	7.808242	2.282382
2006	Apr	5.296816	8.472238	7.843888	2.264883
2006	May	5.306286	8.485455	7.870013	2.270062
2006	Jun	5.31763	8.483285	7.898894	2.322388
2006	Jul	5.340898	8.493986	7.924326	2.270062
2006	Aug	5.347108	8.499701	7.934585	2.3302
2006	Sep	5.352332	8.505829	7.95367	2.336987
2006	Oct	5.355642	8.511839	7.980674	2.351375
2006	Nov	5.360353	8.515772	8.02852	2.341806
2006	Dec	5.366443	8.518392	8.110067	2.261763
2007	Jan	5.375278	8.51963	8.122074	2.292535
2007	Feb	5.379436	8.526133	8.116327	2.272126
2007	Mar	5.396351	8.535485	8.137454	2.261763
2007	Apr	5.406275	8.54475	8.167551	2.261763
2007	May	5.416545	8.561114	8.199299	2.261763
2007	Jun	5.424509	8.574443	8.189022	2.261763
2007	Jul	5.437209	8.583318	8.213734	2.272126
2007	Aug	5.44846	8.622886	8.217897	2.282382
2007	Sep	5.455321	8.644143	8.256062	2.282382
2007	Oct	5.460861	8.672418	8.321203	2.327278
2007	Nov	5.480639	8.762051	8.39342	2.360854
2007	Dec	5.500442	8.794795	8.471045	2.360854
2008	Jan	5.509793	8.81268	8.429956	2.379546
2008	Feb	5.516649	8.854422	8.429476	2.379546
2008	Mar	5.531015	8.968027	8.465226	2.406945
2008	Apr	5.562219	9.143089	8.467288	2.4681
2008	May	5.579352	9.191687	8.512643	2.639057
2008	Jun	5.598052	9.244384	8.485475	2.791165
2008	Jul	5.610936	9.273381	8.529142	2.985682
2008	Aug	5.618225	9.286468	8.514409	3.202746
2008	Sep	5.625461	9.295674	8.560483	3.202746
2008	Oct	5.634075	9.286217	8.588546	3.206803
2008	Nov	5.650733	9.266097	8.631182	3.206803
2008	Dec	5.675726	9.252595	8.739424	3.206803
2009	Jan	5.693395	9.2322	8.712974	3.206803
2009	Feb	5.710096	9.193886	8.683351	3.206803
2009	Mar	5.729775	9.132076	8.703058	3.325036
2009	Apr	5.756691	9.085106	8.703045	3.246491
2009	May	5.780126	8.922125	8.725441	3.246491
2009	Jun	5.818301	8.598589	8.741456	3.250374
2009	Jul	5.829828	8.562262	8.748876	3.254243

2009	Aug	5.827474	8.682775	8.738556	3.254243
2009	Sep	5.827474	8.74705	8.759779	3.254243
2009	Oct	5.826	8.590202	8.834424	3.250374
2009	Nov	5.83364	8.591651	8.909745	3.214868
2009	Dec	5.848171	8.625563	8.931539	3.113515
2010	Jan	5.865646	8.635047	8.958428	2.939162
2010	Feb	5.880086	8.619966	8.955837	2.844909
2010	Mar	5.891589	8.701895	9.001095	2.681022
2010	Apr	5.903589	8.782461	8.990626	2.595255
2010	May	5.919646	8.877954	9.005685	2.557227
2010	Jun	5.930626	8.793476	9.040818	2.587764
2010	Jul	5.942957	8.763115	9.024691	2.541602
2010	Aug	5.942878	8.827879	9.024589	2.541602
2010	Sep	5.945421	8.829914	9.066688	2.525729