

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,
(KNUST)**

THE IMPACT OF INTEREST RATE ON THE GHANA STOCK EXCHANGE.

**A DISSERTATION SUBMITTED TO THE DEPARTMENT OF ECONOMICS,
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY IN
PARTIAL FULFILMENT FOR THE AWARD OF A MASTER OF SCIENCE
DEGREE (MSC) IN ECONOMICS.**

By

OSEI, Otchere Joseph (BSc. Accounting with Computing)

MASTER OF SCIENCE IN ECONOMICS

MAY, 2016.

DECLARATION

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

Osei Otchere Joseph (PG2732114)

.....

.....

Date

Student Name & ID

Signature

Certified by:

.....

Dr. (Mrs) Ofori Abebrese Grace

.....

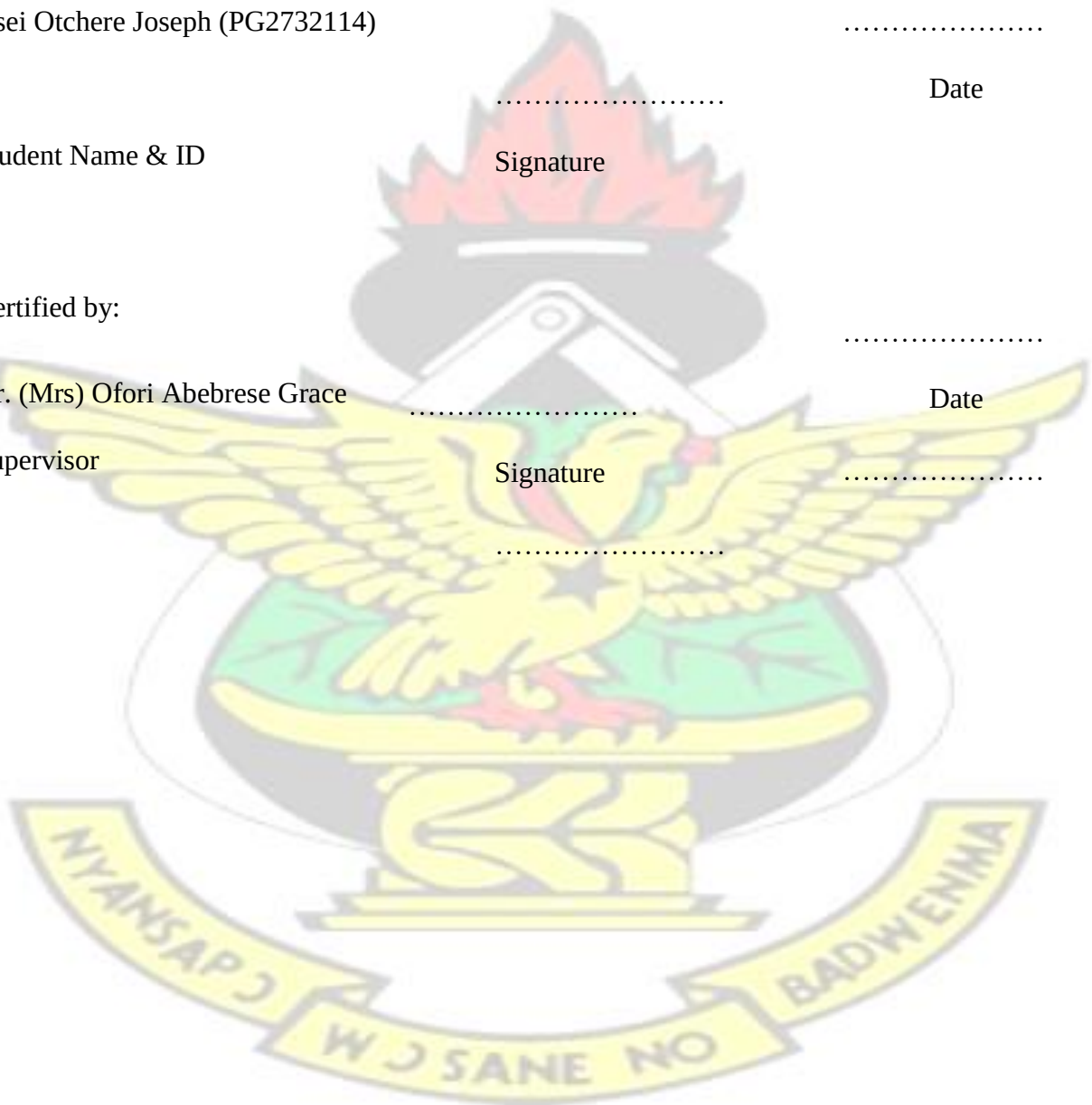
Date

Supervisor

Signature

.....

.....



Dr. Eric Oteng- Abayie

Signature

Date

Examiner

Dr. H. M. Yussif

.....

.....

Signature

Date

Head of Dept. Name

KNUST



KNUST

The logo of KNUST (Kwame Nkrumah University of Science and Technology) is centered in the background. It features a yellow eagle with spread wings perched on a green shield. Above the eagle is a black mortar and pestle with a red flame. Below the eagle is a yellow banner with the text 'NYANSAPƆ WƆ SANE NO BADWENMA' in black capital letters.

DEDICATION

I dedicate this project to GOD ALMIGHTY, for His guidance and protection during the process.

Also, I dedicate this paper to my family and friends, Dr. Maxwell Osei-Ampofo and Rev. Thomas Agyetoo.

ACKNOWLEDGEMENT

First, I would like to express my gratitude to God Almighty for the strength to finish this study.

I also acknowledge my supervisor, Dr. (Mrs) Ofori Abebrese Grace for her cherished input into writing this thesis.

Finally, I must express my very profound gratitude to my friends and course mates especially, Lartey Abraham, LXM (RSVP), for their support and continuous encouragement throughout my year of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them. Thank you and God bless you all.

Osei Otchere Joseph



KNUST

ABSTRACT

The study investigated the effect of interest rate on stock market returns in Ghana. Given that the Treasury bill rate is risk free, this might not truly reflect how the other rates which usually include some degree of risk affects the return on stock in Ghana. The study established the presence of a long run relationship between stock market returns and interest rate using the Johansen and Juselius (1990) test of co-integration and VECM . In the long run, Treasury bill rates and interest rates individually had a negative effect on stock market returns. The individual effect of Treasury bill rates was however more intense than that of lending interest rates. Broad money supply, exchange rate and economic growth were found to have a positive and significant effect on stock returns while inflation had a negative effect on stock returns in the long run. The study therefore recommends that prudent fiscal consolidation measures aimed at reducing government budget deficits should be implemented as this is the main factor that contributes to their desire to borrow heavily from the domestic markets and hence the high rates on the treasury bill.

TABLE OF CONTENTS

CONTENT	PAGE
DECLARATION.....	ii
DEDICATION.....	iv
ACKNOWLEDGEMENT.....	v
ABSTRACT	vi
TABLE OF CONTENTS	vii
LIST OF TABLES.....	viii
 CHAPTER ONE	 1
INTRODUCTION	1
1.1 Background to the study	1
1.2 Problem Statement	4
1.3 Objectives	5
1.4 Hypotheses	5
1.5 Significance of the study	5
1.6 Organization of the Study	6
 CHAPTER TWO	 7
LITERATURE REVIEW	7
2.1 Theoretical Literature	7
2.1.1 Arbitrage Pricing Model (APT)	7
2.1.2 Capital Asset Pricing Model (CAPM)	8
2.1.3 Gordon's theory of Dividend Valuation	10
2.2 Empirical findings	11
 CHAPTER THREE	 14
METHODOLOGY	14
3.0 Introduction	14
3.1 Data Type and Source	14
3.2 Model Specification	14

3.3 Definition and a priori expectation of variables	15
3.3.1 Inflation	15
3.3.2 Exchange Rate	15
3.3.3 91-Day Treasury Bill Rate	16
3.3.4 Broad Money Supply (M2+)	16
3.3.5 Lending Rate (LR)	17
3.3.6 Stock Returns	17
3.4 Estimation Strategy	17
3.4.1 Test for unit root	18
3.4.2 Test for cointegration	18
 CHAPTER FOUR	 21
RESULTS AND DISCUSISION	21
4.0 Introduction	21
4.1 Summary Statistics of variables	21
4.2 Test for Unit root	22
4.3 Test for the existence of a long run relationship	24
4.4 Long run Estimation	25
4.5 Short Run Estimation	28
 CHAPTER FIVE	 32
SUMMARY, CONCLUSION AND RECOMMENDATIONS	32
5.1 Summary of findings.....	32
5.2 Conclusion	32
5.3 Policy Implications	34
 REFERENCES	 35

LIST OF TABLES

TABLE	PAGE
4.1: Result of Summary Statistics	21
4.2: Results of Unit Root test	23
4.3: Johansen Cointegration Test	24

4.4: Results of the Long Run Relationship	25
4.5: Results of the Short-Run/Vector Error Correction Model (VECM).....	29

KNUST



CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Stock exchange is an exchange where security trading is conducted by professional stock brokers who control the buying and selling of stocks and other securities. The size and strength of capital markets and stock markets are considered to be controllers of strength of the national economy and the private sector. Investment capital for private and public sector businesses are very commonly raised from stock markets. The flow and pattern of business and the level and extent of economic activities are but few of the information that a stable stock market able to indicate with likable precision, Fama (1991). Quite steadily, what has become the major problem for local organizations in countries of the developing world is access to funds which could set off long term economic growth. Capital markets are now receiving huge attention from governments in developing countries because provisions from foreign capital markets are currently less reliable. With this attention, governments expect to improve the mobilization of local resource, boost the long-term access to capital and stimulating the resourceful use of domestic assets, Dailami and Atkin (1990).

In July 1989, Ghana's stock market was established as a private "limited by guarantee" company under the Companies Code of 1963 (Act 179). It started trading in November 1990 poised to give confidence to private investors who intended investing in Ghana. In April 1994, the company was converted to a public "limited by guarantee" company. Over the years, the GSE has made and continue to make significant strides. Currently, it oversees the trading of 35 companies all listed on the stock exchange.

The stock market in general assumes a critical function in an economy by way of mobilizing resources available domestically and making them available for investing in productive ventures that add value to the economy. This effect is unfortunately not automatic. To realize this benefit, there must be a significant linkage between the economy and the stock market.

Various researchers have studied the associations between stock market returns and interest rate due to the vital roles these associations play in influencing the development of a country's economy (Aydemir and Demirhan, 2009).

It is the monetary policy of a country that determines interest rates consistent with its economic situation. The value of a company's stocks and shares results from changes in interest rates and consequently the stock returns. Because interest rates are important factors that directly affect economic growth, high interest rates prevent capital outflows, obstruct the growth of the economy and therefore hurt the economy. In contrast, there is an increase in stock prices which in turn reduce the likelihood of financial distress when interest rates are low. The associations between the interest rate and stock market return are justified by the rationale that stock price and interest rates enjoy a negative correlation (French et al., 1987). Very high interest rate is normally due to contractionary monetary policy or the desire of Government to borrow more from the domestic market will normally influence stock market returns negatively. This is because the higher rate, the value of equity tends to reduce. This serves as a disincentive to invest in shares because makes fixed income securities are now more attractive. This can lead in the reduction in the desire of potential and existing investors to invest in stocks or borrow. This will lead to an increase in the cost of operating businesses thereby affecting the margin of profit.

Quite the reverse, lower interest rates which was experienced as a result from expansionary monetary policy serve as a boost to stock market returns (Geske and Roll, 1983; Fama, 1981). The stock market is the critical establishment for the accumulation of substantial capital for the development of economies.

ISSER (2014) posits that real interest rates between 2013 and 2014 have reduced substantially with the exclusion of interest rates on 182-day and 3-year treasury instruments. By way of an example, the rate on a 91-day Treasury bill in 2013 was 9.6% but in 2014 it declined to 8.8%.

For the saving rates it experienced immense deterioration in real terms. As at 2012, the real rate on savings was -3.6%, this declined to -7.8% as at the end of 2013. By the end of 2014, the real rate on savings declined further to -12.0%. Additionally, the real lending rate was not left out although the decline it experienced was not as immense as the savings rate. As at the end of 2013, the real lending rate was 12.06 but it experienced a marginal decline of 0.08% by the end of 2014.

The performance of Ghana's Stock Exchange since its inception has been varied recording both periods of up and downs. The positive performance however outweighs the negative performance. The market witnessed negative returns for six (6) years. In 2009 the stock market recorded a negative return of -46.58% which was the worst performance recorded so far. On the flip side, the GSE witnessed competitive returns year-on-year with the positives averaging around 48.89%. The recent surge in returns on the market was recorded in 2013 when the average returns on the market recorded 78.81% outstripping returns on the fixed income market. In 2003 for instance, the market returned 154.67%, the highest in the history of the exchange (GN, 2015).

1.2 Problem Statement

Empirical research of recent capture a number of macroeconomic and financial variables that affect stock market without an agreement on how appropriate they are as regressors (See Donaldson and Maddaloni 2005; Jansen and Moreira, 2004; Campbell and Yogo, 2003 and Lane 2002). Most of the variables that have received attention in these studies are the price level, inflation, exchange rate, GDP, the rate of unemployment, balance of payments, fiscal balance among others.

In view of this a handful of research have been carried out to ascertain the relationship between stock market returns and macroeconomic variables particularly interest rate in Ghana. The findings of these studies have been varied. For example Anokye and Tweneboah (2008) as well as Kyereboah -Coleman and Agyire- Tettey (2008) found out that treasury bill rate which was used to proxy for interest rate have significant effect on stock market returns while the findings of Kuwornu and Owusu- Nantwi (2011) showed otherwise i.e. no influence of the Treasury bill rate on stock returns was found..

The contradictory results might be due to the different methodological and analytical procedures used in these studies. In addition, studies which have been conducted on the subject matter in Ghana, have proxied for interest rate using the Treasury bill rate. Given that the Treasury bill rate is risk free, this might not truly reflect how the other rates which usually include some degree of risk affects the return on stock in Ghana. This study therefore seeks to individually and jointly estimate the effect of the Treasury bill and lending interest rates on stock returns in Ghana.

1.3 Objectives

The main objective of this study is to estimate the effect of interest rate on stock market returns in Ghana.

1. To investigate if there is a relationship between interest rate and stock returns in Ghana.
2. To estimate the effect of interest rate on stock returns in Ghana.

1.4 Hypotheses

H_0 : There is no relationship between interest rate and stock market return in Ghana.

H_1 : There is a relationship between interest rate and stock market return in Ghana.

H_0 : There is no relationship between interest rate and stock market return in Ghana.

H_1 : There is a negative relationship between interest rate and stock market return in Ghana.

1.5 Significance of the study

Essentially, studies into the relationship between Interest rates and stock market development will help in two directions: policy formulation and development of existing literature on the subject. Policy makers may understand the interest rate and stock market development dynamics and will inform the portfolio choice or diversification by investors in the period of lower (higher) interest rates. In order to boost the growth of the capital market, government may pursue appropriate interest rate policies that will redirect funds to capital market.

1.6 Organization of the Study

The study is organized into five main chapters. The first chapter deals with the general introduction to the study which includes the background, problem statement, hypotheses, relevance and organization of the study. Chapter two deals with a critical review of both the theoretical and empirical literature. Chapter three deals with the methodology of the study. Chapter four focus mainly on the presentation, analysis and discussion of the results in relation to each of the specific objectives of the study. Chapter five deals with the summary of the main findings of the research, conclusion and proffer policy recommendations based on the findings of the research



CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical Literature

2.1.1 Arbitrage Pricing Model (APT)

From Maysami et al (2004), the theoretical framework of most of the early studies conducted on the stock markets which was mainly based on the US stock exchanges was the Arbitrage Pricing Theory (APT) established by Ross (1976). The modus operandi of APT is for all intents and purposes measure the risk premium which is devoted to numerous factors influencing the returns generated on assets to ascertain their significance level or to confirm if they are “priced” into stock market returns. For that reason, Chen, Roll, and Ross (1980), provided the foundation for us all to believe that a long-standing equilibrium does exist concerning the prices of stock prices and macroeconomic variables. This was after they established that the forces of the economy affect the discount rates, the capacity of firms to generate cash flows as well as dividends in the future.

Similarly, Granger (1986) and Johansen and Juselius (1990) researched into the presence of a long-standing equilibrium relationship amongst selected variables by means of cointegration analysis, which paved the path for a favored methodology to investigating the relation concerning economic variables and stock market.

2.1.2 Capital Asset Pricing Model (CAPM)

Markowitz was the first to develop the contemporary theory of portfolio by constructing the model of the mean-variance. This model was purposely fashioned to be able to create the optimum portfolio that is based on the concept of the relation between return and risk which is assumed to be direct i.e. the higher the risk the higher the return. In 1990, Markowitz was

awarded a Nobel Prize for his contribution to knowledge. His work demonstrated that investors can only generate a higher level of return if they organize their portfolio in a manner comparable to the risk level.

Markowitz in his theory showed that in order to reduce risk has must diversify their investments and that stocks are connected to each other. The intuition behind this assertion is as follows: if so happens that the coefficient of correlation of two different stocks is computed, the results obtained will be lower than unity. Hence the overall risk associated with a portfolio is lessened if these individual stocks are part of that portfolio.

This intuitive theory is however not without shortcomings. First and foremost, it is based on the theory of utility. Secondly it relies on heavily on the computation of variance which becomes complex when numerous shares are considered.

In that regard, two authors Sharpe in 1964 and Lintner in 1965 improved upon the work of Markowitz by coming out with the well-known Capital Asset Pricing Model (CAPM). The models main objective was to provide some enlightenment on the variability observed in risk premium over different assets. The model as developed alludes to the fact that the differences as observed was due to the variability in the risk level of the assets involved. This implies that as the risk becomes higher, the returns also tend to be commensurate with the risk. The general specification of the model is as follows:

The general equation of the model is:

$$r_i = r_f + \beta_i(r_m - r_f)$$

where:

r_i^e - expected return of stock i β_i – Relative

risk of share i r_m^e - expected return of the

market portfolio r_f – Risk-free interest rate

The implication of the model is that two variables mainly influence the equilibrium in the capital markets. These variables are r_f (the return one generates for waiting) and r_M (the extra amount of return generated).

The model identified two types of risk that influence returns. These are the diversified risk also known as non-systematic risk as well as non-diversified risk also known as systematic risk. For the non-systemic risk, one can do away with them by diversifying. The systematic risk comes into play when the pricing is considered. The beta coefficient provides a true measure of risk.

The results of studies that seek to lend empirical evidence to the theory of CAPM have been varied. Roll (1977) cast a stern note with some reservations about the practicability of this theory. His main argument was that only the aspect of the theory that deals with the efficiency of the mean and variance efficiency of the portfolio of the market is practicable. However other studies defended the practicability of this theory. Key among them is a study conducted by Cheo (1995) who provided some enlightenment for any missing variable. Sharpe, the author of the model was not silent on the issue. He jumped to the defense of the model his model. Sharpe was of the view that the assertion of returns on stock not having anything to do with a market portfolio is very erroneous and could be deceptive. He was however quick to admit that the CAPM does not totally provide a reflection of the happenings in the market.

2.1.3 Gordon's theory of Dividend Valuation

Gordon (1962) proffered a formal relation concerning today's value of a firm with the following period's dividend, the growth rate of income and the rates on interest. This is expressed below as follows:

$$VAL_{io} = \frac{DIV_{io}}{h_i - j_i}$$

Where VAL_{io} is current value of the firm, DIV_{io} is the following period's dividend, h_i is the future returns expected by the firm and j_i is the expected growth rate of income.

According to this formulation, capital will tend to flow from stocks to bonds market and other kind of financial securities in the event that there is a rise in interest rates and the returns on stocks are expected to be affected negatively. This relation is implicit in the model. For instance, all things being equal, depending on the time frame, in the event that interest rate increases, h_i will also increase. This in turn have a negative influence on returns.

Should this be the case especially in a less competitive market where the bank assumes the role of a price setter? In the event that interest rate rises under a less competitive market, banks can pass this cost on and hence generating increased returns. Additionally, in the event that interest rate rises, income expected in the future is likely to also rise beyond the cost associated with securing those funds and should therefore lead to increased returns.

2.2 Empirical findings

According to Kunt (1996) in the event that interest rates are relatively lesser as compared to countries with higher interest rates, the former have a resilient stock market. In view of this the

extraordinary performance of the stock markets as observed in developing countries can be attributed to the low rates on interest.

Kelen (2000) examined the relation between interest rates and stock market performance in three developing markets. The countries are Zimbabwe, South Africa and Botswana. In these countries high rates on interest were perceived to have a pronounced damage for stock market and its prices. The author therefore established that there exists a negative relationship between the two variables under consideration. This implies that as the interest rates go higher it can lead to the deterioration of stock markets.

A similar research was conducted by Spyrou (2001) in Greece. The author's conclusion was not dissimilar to that of previous ones. Hsing (2004) employed a different method to carry out the relation concerning the variables in question. His method was based on the VAR. The results of his research also confirmed that the rates on interest have a negative influence on the returns on stock.

Osei (2002) formally tested the theory of efficient market in the setting of Ghana stock market. The author based his studies on the formal definition of efficient securities market as espoused by Fama (1970). Fama defined efficient securities market as market in which the prices are a full reflection of information available at the moment. The results of the study revealed the inefficiency in the Ghana Stock Market with reference to the information on yearly earnings which is announced by the various companies listed on the exchange. This is because the market endures wandering up or down further than the week of the announcement.

The subject matter was also investigated by Kyereboah Coleman and Agyire Tettey (2008).

The authors investigated the effect of macroeconomic indicators on the performance of Ghana Stock Exchange. Ghana was used as a case study. The method of data analysis was based on Cointegration and the error correction model. The study revealed the rates on lending as established by commercial banks function as foremost deterrent to the growth of businesses in Ghana. This is because the rate on lending was found to have an indirect influence on stock returns.

Anokye and Tweneboah (2008) conducted a similar work to ascertain the influence of macroeconomic variables on stock returns in the Ghanaian economy. The research focused on both the long run and short run relation concerning the variables in question. The method of analysis was based on Johansen's multivariate cointegration test and procedures innovation accounting. The study revealed that in Ghana, there is the presence of a long run relation concerning the macroeconomic variables used in the study and stock prices in Ghana. The response of impulse function and decomposition of the error Variance point out that interest rate and direct investment by foreigners tends to be significant influencers of the movements observed in the prices of shares.

Furthermore, Kuwornu and Owusu Nantwi (2011) after examining the subject matter, contented that the influence of interest rate on stock returns have been over exaggerated. The study made use of multiple regression estimated using the ordinary least square estimator and the time series method developed by Box-Jenkins. The results revealed the rates on interest does not influence the returns on stock confirming his hypothesis. The prices of crude on the global market and the exchange rate also did not have any influence on the returns on stock.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter focuses on the methodology of the study. The chapter is organized as follows:

Section 3.1 presents the econometric framework of the empirical model of the study while Section 3.2 deals with the estimation strategy of the models. This study individually and jointly estimate the effect of the Treasury bill and lending interest rates on stock returns in Ghana while controlling for other macroeconomic factors. Annual time series data spanning over the period 1990-2013 was used. The study made use of Johansen and Juselius (1990) test of co-integration and VECM to assess a possibility of the presence of a long and a short run relationship between the variables under consideration.

3.1 Data Type and Source

The study made use of annual time series data ranging from 1990-2013. GDP, Lending Rate and Inflation Rate were obtained from World Development Indicators, Exchange rate was obtained from International Financial Statistics (2015) while Money supply and Treasury bill rate were obtained from Bank of Ghana. GSE All share index was obtained from Ghana Stock Exchange.

3.2 Model Specification

Following Kyereboah -Coleman and Agyire- Tettey (2008), the relationship between interest rate and stock returns is specified as;

$$SR_{t} = \alpha_0 + \alpha_1 TB_t + \alpha_2 LR_t + \alpha_3 Z_t + \epsilon_t \quad (3.1)$$

Where SR is stock returns, TB is Treasury bill rate, LR is lending interest rate and Z is a vector of control variables. The vector of control variables included in this study are; exchange rate (EX), real GDP(GDP), inflation rate (IF) and broad money supply (MS).

Thus $Z = (EX, GDP, IF, MS) \dots \dots \dots (3.2)$

Replacing the vector Z by its element in equation (1) results in;

$SR = f(TB, LR, EX, GDP, IF, MS) \dots \dots \dots (3.3)$

The explicit estimable econometric model in its logarithm form is formulated as follows:

$$\ln SR_t = \alpha_0 + \alpha_1 \ln TB_t + \alpha_2 \ln LR_t + \alpha_3 \ln EX_t + \alpha_4 \ln GDP_t + \alpha_5 \ln IF_t + \alpha_6 \ln MS_t + \epsilon_t \dots \dots (3.4)$$

Where all the variables are explained above, α_i are the estimated elasticities given the loglog specification and ϵ_t denotes the error term

3.3 Definition and a priori expectation of variables

3.3.1 Inflation

The study used Consumer Price Index (CPI) to proxy for the rate of inflation. Inflation serves as an indication of the cost of doing business in the economy. Economic theory indicates that inflation decreases the purchasing power of business cash flow. Changes in inflation expectation therefore affect the cost of inputs as well as purchasing power of businesses, hence it is expected that inflation will negatively influence stock returns.

3.3.2 Exchange Rate

Exchange Rate can be defined as the value of a country's currency in terms of another country's currency. The major currency used in the transaction of international trade in Ghana is Dollar. The rate of exchange of the cedi-dollar plays an important role in determining the prices of goods and services in Ghana important since the cost incurred in the importation of raw materials and other inputs will be translated into the cost of doing business. For that reason, the

exchange rate will have an influence on the cash flow of businesses and the amount of dividend paid, thus it is hypothesized that exchange rate will positively influence stock returns.

3.3.3 91-Day Treasury Bill Rate

Treasury bill rate is an opportunity cost incurred for holding shares. Upper Treasury bill rate which is due to contractionary monetary policy or the desire of Government to borrow more from the domestic market will normally influence stock market returns negatively. This is because the higher the interest rate, the value of equity tends to reduce. This serves as a disincentive to invest in shares because it makes fixed income securities now more attractive. This can lead in the reduction in the desire of potential and existing investors to invest in stocks or borrow. This will lead to an increase in the cost of operating businesses thereby affecting the margin of profit.

3.3.4 Broad Money Supply (M2+)

There is considerable amount of work in the literature such as Tursoy et al., (2008), Tahir and Ghani, (2004), Karamustafa and Kucukkale (2003), Groenewold and Fraser (1997) that have documented how money supply affects stock prices. Sprinkel, (1971) for example show that a decline in the rate of monetary growth precedes bear markets by an average of nine months, while an increase in monetary growth rate leads bull markets by an average of two months.

The liquidity of an economy increases when there is an increase in the amount of money supplied. This will normally raise the purchasing power of the citizens. The implication is that more money will now be made available not only for consumption purposes but also for investment purposes. The study therefore expects the amount of money supplied to positively influence the returns on stock.

3.3.5 Lending Rate (LR)

According to World Bank Development Indicators, the rate on lending can be defined as the rate at which banks normally meet the financing requirements of the private sector in both the short and medium term. The level of interest rate influences economic activity through the capital investment process. If interest rates are low they serve as incentives for individuals and businesses to invest. These expenditures make available extra employment opportunities, greater than before output of goods and services, and overall increases in GDP. Interest rates have been closely correlated with economic activity because they closely move with the business cycle. Accordingly the proposition is that it should negatively correlate stock returns.

3.3.6 Stock Returns

The study used GSE All Share index to proxy for the Stock Market Returns. GSE All Share Index which is the wide market indicator of the stock market measures the overall performance of the stock market. The index is calculated by the Ghana Stock Exchange.

3.4 Estimation Strategy

In order to avoid the problem of spurious regression, this study followed three key steps in estimating the model specified above. These are test for the order of integration of the variables, test for cointegration and finally estimating the short and long run parameters of the model. This steps are explained in details below.

3.4.1 Test for unit root

Since most macroeconomic variables tend to be trending and are usually not stationary, it is very imperative to conduct a test for unit root. This is necessary because macroeconomic variables which are normally employed in the analysis tend not to be stationary. The results as estimated thereby tend to be spurious. In such a case, the t-statistic, DW statistic as well as the R^2 values are not accurate and invalid for inference. This study makes use of the Augmented

Dickey Fuller (ADF) Philip Perron (PP) unit root test. The ADF and PP test for unit root tests the hypothesis of null of unit root against the alternate that the variable in question is stationary. Thus acceptance of the hypothesis of null implies that the series has a unit root and hence non-stationary. Similarly, rejection of the hypothesis of unitary root implies that variable in question is stationary.

3.4.2 Test for cointegration

In general, when variables are non –stationary, one way of attaining stationarity is to difference them until they become stationary. But this approach is not without shortcomings.

When the variables are differenced, the model can no longer give a unique long run solution. Cointegration provides appropriate statistical techniques to investigate if there is an economically significant long-run relationship between the variables. The concept of cointegration stems from the fact that even though, two or more variables are not stationary, and a linear combination of them might result in them being stationary.

A long-run equilibrium relationship between the variables is an indication that these variables move collectively over time so that short term shocks from the long term development will be corrected. The absence of cointegration between these variables implies no long run equilibrium relationship and as a result these variables will drift randomly from themselves. The presence of the long-run equilibrium relationship between the variables indicates that linear combinations in no-stationary series have become stationary (Engle and Granger, 1987).

This study makes use of the Johansen maximum likelihood cointegration innovated by Johansen and Juselius (1990) among the various alternatives available. This approach is centered on the maximum likelihood estimation and in so doing eludes the inconsistencies of the OLS estimation. This method also makes it possible for the researcher to estimate simultaneous models that involves more than one variable. It is also more suitable and efficient

for determining the number of cointegrating vectors without depending on a random normalization.

Two different likelihood ratio tests of the significance has been proposed by Johansen .These are the trace test and maximum eigenvalue test, shown in equations 3.5 and 3.6 respectively.

$$J_{trace} = -\sum_{i=r+1}^p T \ln(1 - \lambda_i^2) \dots \dots \dots 3.5$$

$$J_{max} = -T \ln(1 - \lambda_{r+1}^2) \dots \dots \dots 3.6$$

The total size of the sample and is represented by T which is the i^{th} largest canonical correlation. The hypothesis of null of the trace test is that there exists *r number of* cointegrating vectors as opposed to the alternate hypothesis of the existence of *n number of* cointegrating vectors. Conversely, the test based on the maximum eigenvalue, tests the hypothesis of null of *r* cointegrating vectors as opposed to the alternate hypothesis of *r +1* cointegrating vectors. In general, the two test statistics does not follow the chi square distribution and thus the asymptotic critical values which can be found in Johansen and Juselius (1990) and are also specified by most econometric software packages.

$$\ln SR_t = \alpha_0 + \alpha_1 \ln(TB)_{t-1} + \alpha_2 \ln(LR)_{t-1} + \alpha_3 \ln(EX)_t + \alpha_4 \ln(Y_t) + \alpha_5 \ln(IF)_{t-1} + \alpha_6 \ln(MS)_{t-1} + \alpha_7 ECM_{t-1} \quad 3.7$$

All variables are as defined already. ECM_{t-1} is the error correction term, the residuals that are obtained from the estimated cointegrating model of equation (3.7). α_1 denotes the first differenced form of the variables in the model. The coefficients measure the (short-run) impact a change in the independent variable has on a change in the dependent variable respectively. α_7 is the coefficient on the error correction term which represents the speed of the adjustment

parameter which measures the speed of adjustment to long run equilibrium after a shock to the system. The lag length used in place of P is automatically selected by the econometric software employed.

KNUST



CHAPTER FOUR

RESULTS AND DISCUSISION

4.0 Introduction

This chapter presents and discusses the results obtained in line with the objectives of the study.

4.1 Summary Statistics of variables

The descriptive statistics of the variables under study was analysed to uncover the basic features and general overview of the data set for the study. The results are presented in Table 4.1

Table 4.1: Result of Summary Statistics

Variable	Mean	Std Deviation	Minimum	Maximum
INF	20.878	12.79	8.73	59.46
GDP	16707.62	6764.77	9024.37	32644.14
EXC	0.708	0.597	0.033	1.954
TB	26.142	11.56	9.65	47.93
LR	31.534	7.085	23.75	47
MS	13.245	2.107	9.43	18.28
SR	2544.61	2961.4	62.17	10431.64

From Table 4.1 it can be observed that over the sample period, the mean of inflation was 20.88%. Inflation rate varies between 8.73 and 59.46. The degree of variability is also witnessed by the standard deviation. Inflation rate deviates from its mean on average by 12.79. Gross Domestic product is on average estimated at 16707.62 over time. The data vary between 9024.37 and 32644.14. The range of variation causes the data to deviate from the sample mean 6764. The cedi- dollar exchange rate averages 0.708. The values range between

0.033 and 1.954 with a standard deviation estimated at 0.708 over the sample period. Also, the rate on Treasury bill averaged 26.14% over the sample period and ranges from 9.65% to 47.93%. Treasury bill rate deviates from its mean on average by 11.56. The average lending rate over the sample period was 31.53% and ranges between 23.75% and 47% with a standard deviation of 7.085. The average money supplied over the period under consideration was 13.24 and range between 9.43 and 18.28. Lastly, the stock market returns averages 2544.61. The values range from 62.17 and 10431.64 with the standard deviation estimated at 2961.

4.2 Test for Unit root

The Phillips Perron (PP) and Augmented Dickey Fuller (ADF) tests were used in this study to examine the time series characteristics of the variables to be able to discern their order of integration. Table 4.2 is a presentation of the results.

Table 4.2: Results of Unit Root test

	ADF		PP	
Variable	Constant No trend	Constant Trend	Constant No trend	Constant Trend
LOG LEVEL				
lnINF	-2.255	-3.478**	-2.815**	-3.437**
lnGDP	3.014	0.670	4.335	1.170
lnEXC	-2.378	-1.469	-2.231	-0.949
lnTB	-1.715	-3.211*	-1.857	-2.503
lnLR	-1.489	-2.010	-1.519	-1.822
lnMS	-2.663*	-2.487	-2.489	-2.724
lnSR	-1.948	-1.125	-1.710	-1.189
FIRST DIFFERENCE				
lnINF	-4.156***	-4.194***	-5.486***	-5.360***
lnGDP	-4.156***	-3.794**	-2.413**	-4.063***
lnEXC	-2.698*	-3.920**	-5.360**	-3.869***

lnTB	-5.043***	-4.909***	-4.696***	-4.571***
lnLR	-2.925**	-3.241*	-4.749***	-4.920***
lnMS	-3.598***	-3.491**	-6.095***	-6.041***
lnSR	-3.066**	-3.938***	-4.500	-4.916***

*, **, **** show significant at the 10%, 5% and 1% significance level respectively

The results indicate that inflation rate does not possess a unit root based on both the ADF and PP test. The ADF test with constant and trend indicates that the Treasury bill rate does not possess a unit root. The study however fails to reject the null hypothesis that the remaining variables possess unit root. This indicates that these variables are not stationary in log levels. The existence of unit root in a variable implies non-stationarity. The economic implication of unit root is that, once any of the variables experiences a shock, the effects will be long-lasting and estimations based on non-stationary variables are very likely to lead to the production of spurious results.

The study proceeded to test their order of integration in first difference. All the variables considered in this study became stationary after the first difference and all the variables became integrated of order one.

4.3 Test for the existence of a long run relationship

After establishing the stationarity of the variables, the study proceeded with the Johansen multivariate co-integration test so as to test for the presence of a long-run equilibrium relationships (co-integration) among the series. Table 4.3 shows the results of the Johansen and Juselius (1988, 1990) method. The optimum lag length of two (2) was chosen based on AIC.

Table 4.3: Johansen Cointegration Test

		Trace Test	Max-Eigen

Maximum Rank	Eigen Value	Trace Statistic	0.05 critical value	Max-Eigen Statistic	0.05 critical value
0	0.92099	138.9367	124.24	58.3769	45.28
1	0.65382	80.5598*	94.15	24.39868*	39.37
2	0.56997	56.1612	68.52	19.4098	33.46
3	0.43904	23.4549	47.21	13.2965	27.07
4	0.39605	11.8569	29.68	11.5979	20.97
5	0.23552	5.6801	15.41	6.1769	14.07

*means rejection hypothesis of null at 5% level

The test begins with the hypothesis of null that there is the absence of cointegration between the dependent variable and the independent variables. It can be seen that the trace statistic of 138.94 is above the 95-percent critical value (124.24). Thus the hypothesis of null which states that there is the absence of cointegration (none) cannot be accepted. The alternate hypothesis that there is only one cointegration relationship is hence accepted. The hypothesis of null which states that the maximum cointegration relationship is one (1) is accepted because the trace statistic (80.56) is well below the 95-percent critical value (94.15). Conversely, the hypothesis of null which states that the number of cointegration rank is zero which implies the absence of cointegration among the variables can also not be accepted by the Max-Eigen statistic. The hypothesis of null that the maximum co-integration rank is equal to 1 is however not rejected. It is thus established that, stock market returns and other macroeconomic variables share a long run relationship.

4.4 Long run Estimation

Since the outcome of the co-integration test indicates strong evidence of the presence of a long run relationship among the variables, the study proceeded to estimate the exact nature of the long-run equilibrium relationships among the variables. The result is displayed in Table 4.4.

Table 4.4: Results of the Long Run Relationship

Variables	Coefficient	Standard Error
-----------	-------------	----------------

Constant	55.78***	2.285
lnMS	0.723***	0.115
lnLR	-0.765***	0.024
lnTB	-0.328***	0.013
lnEXC	0.388***	0.007
lnGDP	0.823***	0.023
lnINF	-0.763***	0.045

**** , *** means significant at the 5% and 1% level respectively.**

From table 4.4, Broad money is revealed to have a positive and significant influence on stock market returns in Ghana. A 1% increase in broad money supply leads to 0.72% increase in stock market returns. Theoretically, Keynes explains that when money supply increases interest rate falls. A fall in interest rate in the economy makes investment in the stock market more attractive and therefore increasing stock returns. This meets the a priori expectation of the study. This finding however contrast that of Frimpong (2009) who found a negative effect of money supply on stock market returns.

The coefficient of the lending rate is -0.765 and significant at 1% significance level. This indicates that a 1% increase in the lending rate in the country leads to 0.76% decrease in stock market returns. Lending rates in the country has been increasing because the government has been the largest borrower in the money market. Increasing demand for domestic borrowing of the government make financial institutions and the general public participate more in the money market than in the capital market as this serves as a disincentive to invest in shares. Here, fixed income securities become more attractive and therefore reduces the value of equity. This can lead to a reduction in the desire of potential and existing investors to invest in stocks or borrow. From another perspective, high lending rates increases the cost of operating businesses thereby affecting the profit margin of firms. The negative influence of lending rate on stock market

returns can be attributed to the fact that businesses find it difficult to invest in capital expenditures when the lending rates are too high. The higher rate on lending translates into higher cost of production which leads to decreased economic activity thereby affecting profitability. Fall in profits of firms adversely affect the value of firms and therefore their share prices and stock market returns. This finding agrees with that of Kyereboah-Coleman and Agyire-Tettey (2008) but contradict that of Kuwornu and Owusu Nantwi (2011) who did not find a significant influence of interest rate on stock returns.

It can be seen from the estimated model that the Treasury bill rate has a negative relationship with stock market returns. With a coefficient of -0.328, a 1% increase in Treasury bill rate leads to 0.33% decrease in stock market returns. Treasury bill is an alternate investment to shares so when Treasury bill rates are high, investor prefer to allocate their funds to the purchase of treasury bills instead of buying shares. This is because investment in Treasury bills is less risky than that of shares. This implies that the desire of the government to borrow from the domestic market adversely affect stock returns and for that matter, the availability of funds for firms listed on the Ghana Stock Exchange. This finding contradicts that of Anokye and Tweneboah (2008) which revealed a positive and significant influence of Treasury bill rates on Stock market returns in Ghana.

For exchange rate, a positive and significant effect is observed. Specifically a 1% appreciation of the cedi against the dollar leads to 0.39% increase in stock market returns. A possible explanation could be that, most inputs of production in the industrial sector in Ghana are imported. Therefore an appreciation of the cedi implies that the cost of inputs and to a larger extent the cost of production is reduced which leads to an increase in economic activity thereby increasing stock returns. In the purchase of share, foreign investors prefer investing in stock markets of countries with appreciating currencies. This is because they expect to convert their expected dividends into an appreciating currency and therefore worth investing. Reduction in

cost of production and increase in demand for shares on the exchange increase share prices and for that matter stock returns. This agrees with the findings of Kuwornu and Owusu - Nantwi (2011).

Increased economic growth also leads to an increase in stock market returns and it is significant at 1% level. A 1% increase in GDP leads to 0.82% increase in stock market returns. Increases in GDP increase the level of economic activity. This increase the value of domestic firms and thus the stock returns.

Finally inflation rate was found to have a negative influence on stock market returns. A 1% increase in inflation leads to a 0.76% decrease in stock returns. Prices of goods and services tend to increase due to inflationary pressures which affect the purchasing power of consumers and investors. The implication is that more income now will be used to purchase a given amount of good and services which decreases the amount available for savings and investment purposes. The finding agree with that of Kuwornu and Owusu - Nantwi (2011).

4.5 Short Run Estimation

The study made use of the Granger representation theorem (Granger, 1983, Engle and Granger, 1987) to estimate the vector error correction model (VECM). The theorem states that “if the vector time series variables in Z can be represented as an ECM, then they are found to be cointegrated and vice versa. The short-run dynamics of the model is captured by the VECM. In the same way to the long-run coefficients, the short run coefficients are shortrun elasticities. The short run estimates are presented in Table 4.5.

Table 4.5: Results of the Short-Run/Vector Error Correction Model (VECM)

Variables	Coefficient	Standard Error
Constant	0.605***	0.067
$\Delta \ln MS(-1)$	-0.454	1.037

$\Delta \ln LR(-1)$	-0.201***	0.024
$\Delta \ln TB$	-0.409***	0.070
$\Delta \ln EXC$	-1.278	1.424
$\Delta \ln GDP$	0.724	0.634
$\Delta \ln INF(-1)$	0.095***	0.036
Ect-1	-0.508**	0.253
R Squared	0.6342	
Hetereskedasticity ARCH test	0.1037(.0747)	
Serial correlation LM test	0.304(0.581)	
Jarque-Bera Normality test	1.259(0.532)	

Money supply has a negative relationship with stock market returns in the short-run. Unlike the long-run results, increases in money supply reduces stock market returns. This result is however not significant.

Consistent with the long-run results, the coefficients of Treasury bill rate and lending rates in the short-run are also negative and significant.

The short-run results indicate that exchange rate exert negative influence on stock market returns. This implies that the depreciating domestic currency (Cedi) increases stock market returns. This means that stock prices do not respond to the depreciating currency. This is probably due to few foreign investors on the Ghana stock exchange. This result is not significant.

Gross domestic product maintains its relationship with stock market returns but the results is not significant.

Inflation unlike the long-run result exerts a positive impact on stock returns in the short-run. This implies that a 1% fall in the rate of inflation leads to a 0.095% increase in stock market returns. It could be inferred that the investment decisions of Ghanaians on the stock market are not disconcerted by inflationary pressure in the short-run

The results of the short-run model gives an R-squared (R^2) of 0.63. It implies that 63% of the variation in stock market returns is explained by the macroeconomic variables. This is good and speaks well of the model because the independent variables account for a greater difference in the dependent variable. The model also passed the residual diagnostics tests of normality and autocorrelation (using the Jarque-Bera statistic and Breusch-Godfrey Serial Correlation LM Test). The model also passed the heteroskedasticity test (ARCH). They all show p-values greater than 5%. These imply that all the variables are jointly normally distributed; there is the absence of autocorrelation and heteroskedasticity. The implication of this is that the model can be used for analysis and policy interpretation.

The coefficient of the lagged error correction term measures the speed of adjustment of stock market returns to long run equilibrium due to changes in the explanatory variables. From the result, it can be seen that the coefficient of the lagged error term is correctly signed (i.e. negative) in all three models.

For the estimated model, it can be seen that the coefficient of the lagged error correction term is **-0.508**, indicating that only 50% of a deviation from the long run in the preceding year is corrected in the current year. This suggests that it takes up to 2 years for the stock market to return to full equilibrium after the macroeconomic variables experience a shock. The results

also indicates that the lending rate, Treasury bill rate and inflation negatively influence stock returns in the short run. The first lag of each of these variables affect stock market returns.

This implies that the previous years' values of lending rate, Treasury bill rate and inflation negatively affect stock returns.

KNUST



CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of findings

The study established the existence of a long run relationship among the variables. The study found out that in the long run, Treasury bill rates and interest rates individually have a negative effect on stock market returns. The study found out that Treasury bill rates and lending rates jointly have a negative effect on stock returns. However, the effect of Treasury bill on stock returns was milder than that of lending rate in this case.

Broad money supply, exchange rate and economic growth were found to have a positive and significant effect on stock returns while inflation had a negative effect on stock returns in the long run.

In the short run, the lending rate, Treasury bill rate, money supply and exchange rate negatively influence stock returns and inflation and GDP exert positive impact on stock returns.

5.2 Conclusion

The main objective of this study is to estimate the effect of interest rate on stock market returns in Ghana. The study investigated the individual effects of Treasury bill rate and lending rate on stock returns in Ghana. The study also investigated the joint effect of Treasury bill and lending rate on stock market returns while controlling for other macroeconomic factors. Annual time series data spanning over the period 1990-2013 was employed. The study made use of Johansen and Juselius (1990) test of co-integration and the VECM to assess a possibility of the presence of a long and a short run relationship between the variables under consideration.

The study established the existence of a long run relationship among the variables. The study found out that in the long run, Treasury bill rates and interest rates individually have a negative effect on stock market returns. The study found out that Treasury bill rates and lending rates jointly have a negative effect on stock returns. However, the effect of Treasury bill on stock returns was milder than that of lending rate in this case. Broad money supply, exchange rate and economic growth were found to have a positive and significant effect on stock returns while inflation had a negative effect on stock returns in the long run.

In the short run, the lending rate, Treasury bill rate, money supply and exchange rate negatively influence stock returns in the short run. The coefficient of the lagged error correction term is - 0.508, indicating that only 50% of a deviation from the long run in the preceding year is corrected in the current year. This suggests that it takes up to 2 years for the stock market to return to full equilibrium after the macroeconomic variables experience a shock.

Interest rates and stock returns drift together in the long run and share a mutual equilibrium. The individual effect of Treasury bill rates on stock returns is much higher than that of lending rates. However, the lending rates tend to have a higher influence on stock returns than Treasury bill rates do have when their combined influence is investigated. It is therefore justifiable to conclude that lending rates and Treasury bill rates are important factors influencing stock market returns.

5.3 Policy Implications

Government should take steps to reduce the Treasury bill rates due to its negative impact on stock market returns. This can be done by implementing prudent fiscal consolidation measures aimed at reducing government budget deficits. The main factor that contributes to the

government's desire to borrow heavily from the domestic markets is the rising deficits on government budget. Government could also consider borrowing from external sources to reduce its participation in the money market and for that matter the rising Treasury bill rate.

Also, lending rates play an important role in determining stock market returns hence banking institutions in Ghana should be efficient in their operations as this will lead to a decrease in their cost of operations. This will translate into lower lending rates.

Furthermore, existing investors and potential investors should closely monitor the movements in Treasury bill rate, lending rates and inflation in the short run in deciding whether to invest in stocks.

REFERENCES

- Adjasi, C., Harvey, S.K., and Agyapong, D. (2008). Effect of Exchange rate Volatility on the Ghana Stock Exchange, African Journal of Accounting, Economics, Finance and Banking Research Vol.3.No.3.
- Aydemir, O., Demirhan, E., 2009. "The relationship between stock prices and exchange rates: Evidence from Turkey," International Research Journal of Finance and Economics, Issue 23, pp.207-15
- Chen, N. F., Roll, R. & Ross, S. 1986. Economic forces and the stock market. Journal of Business 59(3): 83-403.
- Dailami, M. and Atkin, M. (1990). *Stock markets in developing countries : key issues and a research agenda*. Policy, Research, and External Affairs working papers ; no. WPS 515. Financial policy and systems. Washington, DC: World Bank.
- [http://documents.worldbank.org/curated/en/1990/10/700162/stock-](http://documents.worldbank.org/curated/en/1990/10/700162/stock-markets)
[markets](http://documents.worldbank.org/curated/en/1990/10/700162/stock-markets-)

- Demirgüç-Kunt, A., & Levine, R. (1996). Stock markets, corporate finance, and economic growth: an overview. *The World Bank Economic Review*, 10(2), 223-239.
- Donaldson, J.B. and A. Maddaloni. (2002). "The Impact of Demographic Reference on Asset Pricing in an Equilibrium Model", Working Paper, Columbia University Business School.
- Fama, E. (1991). "Efficient Capital Markets II", *Journal of Finance*, 46, pp. 1575- 617.
- French, K.R., Schwert, G.W., and Stambaugh R.E. (1987). Expected Stock Returns and Volatility. *J. Financ. Econ.* 19: 3-29.
- Geske, R., & Roll, R. (1983). The fiscal and monetary linkage between stock returns and inflation. *The Journal of Finance*, 38(1), 1-33.
- Gordon, M. J. (1959). Dividends, earnings, and stock prices. *The Review of Economics and Statistics*, 99-105.
- Granger, C. W. (1986). Developments in the study of cointegrated economic variables. *Oxford Bulletin of economics and statistics*, 48(3), 213-228.
- Granger, C. W. J. 1986. Developments in the study of cointegrated economic variables. *Oxford Bulletin of Economics and Statistics* 48: 213-228.
- Jansen, M. and Moreira, M.J. (2004). "Optimal Inference in Regression Models with Nearly Integrated Regressors," Working Paper, Harvard University Campbell and Yogo, 2003
- Johansen, S. & Juselius, K. 1990. Maximum likelihood estimation and inference on cointegration with application to the demand for money. *Oxford Bulletin of Economics and Statistics* 52: 169-210.

- Johansen, S., and Juselius, K. (1999). "Maximum Likelihood Estimation and Interference on Cointegration with Applications to the Demand for Money", Oxford Bulletin of Statistics, May, 169-210.
- Kuwornu, K. M., and OwusuNantwi, V. (2011) Macroeconomic Variables and Stock Market Returns: Full Information Maximum Likelihood Estimation, Research Journal of Finance and Accounting ISSN 2222-1697 (Paper) ISSN 22222847 (Online) Vol 2, No 4, 2011
- Kyereboah-Coleman A., and Agyire-Tettey Kwame F., (2008), "Impact of macroeconomic indicators on stock market performance: The case of the Ghana Stock Exchange", The Journal of Risk Finance, Vol. 9 Iss: 4 pp. 365 378.
- Maysami, R. C., Howe, L. C., & Hamzah, M. A. (2004). Relationship between macroeconomic variables and stock market indices: cointegration evidence from stock exchange of Singapore's all-S sector indices. *Jurnal Pengurusan*, 24(1), 47-77.
- Osei, V. (2005). Does the stock market matter in Ghana? A granger-causality analysis. *Bank of Ghana*, WP/BOG-05/13.
- Ross, S. A. (1976). The arbitrage theory of capital asset pricing. *Journal of Economic Theory* 13: 341-360
- Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The journal of finance*, 19(3), 425-442.
- Spyrou, S. I. (2001). Stock returns and inflation: evidence from an emerging market. *Applied Economics Letters*, 8(7), 447-450. Hsing (2004)