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THE IMPACT OF TREASURY BILL RATE AND INTEREST RATE ON THE STOCK MARKET RETURNS: CASE OF GHANA STOCK EXCHANGE

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ABSTRACT

Several studies have suggested that macroeconomic variables affect Stock market returns using Treasury bill rate as a measure of interest rate. The study examines the joint impact of interest rates and Treasury bill rate on stock market returns on Ghana Stock Exchange over the period between January 1995 and December 2011. Using Johansen's Multivariate Cointegration Model and Vector Error Correction Model the study establish that there is cointegration between Interest rate, Treasury bill rate and stock market returns indicating long run relationship. On the basis of the Multiple Regression Analysis (OLS) carried out by Eviews 7 program, the results show that Treasury bill rate and interest rate both have a negative relationship with stock market returns but are not significant. These results lend support to the idea that interest rate and Treasury bill rate has both negative relationship but weak predictive power on stock market returns independently. The study conclude that interest rate and Treasury bill rate jointly impact on stock market returns in the long run. Understanding the effects of both Treasury bill rate and interest rate dynamics on stock market returns will help investors, fund and portfolio managers and firms make better investment decisions.

JEL CLASSIFICATION & KEYWORDS

■ E43 ■ E47 ■ G12 ■ TREASURY BILL ■ INTEREST RATE ■ STOCK MARKET RETURNS ■ GHANA STOCK EXCHANGE

INTRODUCTION

Most studies suggested that macroeconomic environment had an important effect on the stock market returns. Maintaining macroeconomic stability had been one of the main challenges for developing countries. The relationships between stock market returns and interest rate has been examined by researchers as it play important role in influencing a country's economic development (Aydemir and Demirhan, 2009). Interest rates are determined by monetary policy of a country according to its economic situation. Changes in interest rates influence the value of a company's stocks and shares and thus the stock returns. High interest rate will prevent capital outflows, hinder economic growth and, consequently, hurt the economy as interest rates is one of the most important factors affecting directly the growth of an economy. Lower interest rates increase stock prices which in turn reduce the probability of financial distress. The rational for the relationship between the interest rate and stock market return are that stock prices and interest rates are said to be negatively correlated French et al. (1987). Higher interest rate resulting from contractionary monetary policy usually negatively affects stock market return because higher interest rate reduces the value of equity and makes fixed income securities more attractive as an alternative to holding stocks. This may reduce the tendency of investors to borrow and invest in stocks, and raises the cost of doing business and hence affects profit margin. On the contrary, lower interest rates resulting from expansionary monetary policy boosts stock market (Fama, 1981; Geske and Roll, 1983). The stock markets constitute the most important institution for massive capital formation geared towards economic development. Factors such as capital market capitalization rate, government stock rate, exchange rate, money supply, rate of interest charged on financial instruments amongst others exert some impact on the development and growth of the economy. Several studies have been done on how certain macroeconomic variables affect stock market returns. Mahmudul and Gazi (2009) found that interest rate exerts significant negative relationship with share price for markets of countries such as Australia, Bangladesh, Canada, Chile, Colombia, Germany, Italy, Jamaica, Japan, Malaysia, Mexico, Philippine, South Africa, Spain, and Venezuela. Humpe and Macmillan (2007) find that both US and Japan stock prices are negatively correlated to a long term interest rate.

The effect of interest rate on stock returns has been studied over emerging markets as well (Al-Sharkas, 2004). Adam and Tweneboah (2008) find the relationship between stock prices and interest rates to be negative and statistically significant on Ghana stock market. All these studies used Treasury bill rate as a measure of interest rate which may not be a true reflection of investment cost. Corporate bodies borrow at the lending rate which is the cost of debt and investors sometimes borrow at the lending rate to invest in the stock market. For that matter, using Treasury bill rate as a measure of interest rate may not reflect the actual opportunity cost of capital and that the lending rate should be used as a measure of interest rate. This study examines the impact of interest rates and Treasury bill rate on the stock market returns on Ghana Stock Exchange over the period of 1995-2011. The main purpose of this study was to examine the joint relationship between interest rate (lending rate) and Treasury bill rate (risk-free rate) on stock market returns on Ghana Stock Exchange (GSE) over this period. The study seeks to fill the gap in the literature, which had, so far, focused mainly on Treasury bill rate as a measure of interest rate and hence set the stage for more research in the area of using lending rate as a measure of interest rate. The significance of this research is to help investors and portfolio managers to determine whether treasury bill rate or/and interest rate affect market returns and whether investors should be observing the two variables together in rebalancing their portfolio in oder to make good investment decision.

Literature review

Andros et.al. (2007), in finance, Capital Asset Pricing Models have been used to measures the risk of a security by the security's covariance with the stock market return. However, the CAPM has been severely challenged since returns can be predicted from other financial factors (Fama & French 1992, 1993). This has led to the development and testing of various alternative asset pricing specifications, such as the arbitrage pricing theory (APT)(Ross, 1976) that assumes returns are generated by a number of macroeconomic

factors, while the Consumption or C-CAPM, measures the risk of a security by the covariance (consumption beta) of its return with per capita consumption. Unfortunately, studies undertaken to test the C-CAPM with data from both U.S. and other countries have been largely negative (Campbell & Cochrane 2000; Kocherlakota, 1996). The poor performance of the CAPM and the C-CAPM suggests expected returns are more likely to be driven by more complex stochastic behaviour. However, it is widely accepted that changes in macroeconomic variables contain important information for market participants, both in the short- and the long horizons. It is hypothesized that investors incorporate such information into their estimates of the appropriate discount rate and the expected dividends flow that in turn affects stock returns (Chen, 1991). Existing studies model the association between asset prices and other real economic indicators in terms of production rates, productivity, consumption, growth rate of money supply, unemployment, yield spread, and so on. In multivariate setting Ross's APT multi-factor models have become very popular in the asset pricing. APT allow an asset to have one, or many measures of systematic risk. Each measure captures the sensitivity of the asset to the corresponding pervasive factor. The advantage of factor analytic techniques is that the factors determined from the data explain a large proportion of the risks in that particular dataset over the period under consideration but the drawback is that factors usually have no economic interpretation. To overcome this drawback it was suggested that macroeconomic variables must be selected to estimate stock returns. Many studiies found a significant relationship between stock returns and economic variables (Fama, 1981; Chen et al., 1986; and Harvey, 1991).

Emprical review in the reveloped economies and the emerging and developing economies using APT models

Empirical studies undetaken in in the developed economies by the following researchers found a significant relationship between Stock returns and macroeconomic variables using APT models ((Chen, et al., (1986); Pari and Chen, (1984); Hamao, (1988); Mukherjee and Naka, (2005); Fama, (1981); Harvey, (1991); Burmeister and Wall (1986); French et al., (1987); Bulmash and Trivoli (1991); Brown and Otsuki (1990); Shanken and Jay (1990); Campbell (1987); Poon and Taylor (1991); Abdullah and Hayworth (1993); Clare and Thomas (1994); Priestley (1996); Lee (1997); Harasty and Roulet (2000); Humpe and Macmillan (2007)).

Similarly, an extensive study has been done on the relationship between stock market returns and macroeconomic variables in the emerging and developing economies using APT models with various results. Studies done by ((Zhou (1996); Goswami and Jung (1998); Darrat, (1990); Maysami et al. (2004); Abugri (2008); Niarchos and Alexakis (2000); Jefferis and Okeahalam (2000); Muradoglu, Metin and Argac (2001); Maysami and Sims (2002a, 2002b, 2001a, 2001b); Hendry (1986); Wongbangpo and Sharma (2002); Islam (2003); Chong and Koh (2003); Ibrahim and Aziz, (2003); Booth and Booth, (1997); Maysami, Howe and Hamzah (2004); Yildirtan (2007); Kandir (2008); Tursoy et al. (2008); Maghyereh, A. I. (2002); Leon (2008); Zafar, Urooj, and Durrant (2008); Mahmood and Dinniah (2009); Gazi and Hisham (2010); Ahmet Büyükşalvarcı (2010); Ahmet Ozcan (2012); etc.

The results of the various studies on the relationship between macroeconomic variables and stock market in developed, emerging and developing economies arrives at different conclusion. The findings of some are not consistent with other findings within the emerging and global economies context. All these findings suggest that one cannot use one country to predict another country. Therefore, certain macroeconomic variables that may influence stock market in one country may not influence the other country stock market.

Empirical review - Ghana

Few studies have been done on the linkages between stock market returns and macroeconomic variables in the Ghanaian context. As this study is centred on Ghana Stock Market, it is empirical to review studies done in the area and also contribute to the existing knowledge by examining the impact of Treasury bill rate and interest rate (proxy as lending rate) on stock market returns.

Osei (2002) tested the market efficiency hypothesis theory in the context of Ghana stock market. His studies was based on Fama (1970) definition of efficient securities market – as one in which prices "fully reflect" the available information. The study establishes that the market continues drifting up or down beyond the announcement week and is inconsistent with the efficient market hypothesis (EMH) define by Fama (1970). The conclusion is that the Ghana Stock Market is inefficient with respect to annual earnings information releases by the companies listed on the exchange. The study does not support the information efficiency theory and that there may be other factors that influence the stock market. This may have led other researchers to expand the work of Osei (2002) to investigate other macroeconomic factors that may influence stock market performance. Kyereboah-Coleman and Agyire-Tettey (2008) examine how macroeconomic indicators affect the performance of stock markets by using the Ghana Stock Exchange as a case study. Cointegration and the error correction model techniques were employed to ascertain both short and long-run relationships. Findings of the study reveal that lending rates from deposit money banks have an adverse effect on stock market performance and particularly serve as major hindrance to business growth in Ghana. Again, while inflation rate was found to have a negative effect on stock market performance, the results indicate that it takes time for this to take effect due to the presence of a lag period, and that investor's benefit from exchange-rate losses as a result of domestic currency depreciation. Similar work done by Anokye and Tweneboah (2008) examined the role of macroeconomic variables on stock returns movement in Ghana. They analyse both long-run and short-run relationships between the stock market index and some macroeconomic variables using Johansen's multivariate cointegration test and innovation accounting techniques. They established that there is cointegration between macroeconomic variables identified and stock prices in Ghana indicating long run relationship. Result of impulse Response Function (IRF) and Forecast Error Variance decomposition (FEVD) indicate that interest rate and foreign Direct Investment (FDI) are the key determinants of the share price movements in Ghana. Kuwornu and Owusu-Nantwi (2011) arrive at different conclusion by examining the relationship between macroeconomic variables and stock market returns. The ordinary least square estimation (OLS) model in the context of Box-Jenkins time series methodology was used in establishing the relationship between macroeconomic variables and stock market returns. Empirical findings reveal that there is a significant relationship between stock market returns and consumer price index (inflation). On the other hand, crude oil prices, exchange rate and Treasury bill rate do not appear to have any significant effect on stock returns. Both Kyereboah-Coleman and Agyire-Tettey (2008) and Anokye and

Tweneboah (2008) conclude that interest rate used as proxy of treasury bill rate have significant effect and cointegrated with stock market returns but Kuwornu and Owusu-Nantwi (2011) findings reveal that Treasury bill rate have no significant effect on stock returns. The conflicting result may be due to the analytical tool used or methodology design. Kyereboah-Coleman and Agyire-Tettey (2008) and Anokye and Tweneboah (2008) used cointegration test and vector error correction model (VECM) analytical tool in arriving at their conclusion whiles Kuwornu and Owusu-Nantwi (2011) used the ordinary least square estimation (OLS) model in the context of Box-Jenkins time series methodology to established the relationship between macroeconomic variables and stock market returns. Adjasi, Harvey and Agyapong (2008) studied the relationship between Stock Markets and Foreign Exchange market, and determined whether movements in exchange rates have an effect on stock market in Ghana. The Exponential Generalised Autoregressive Conditional Heteroskedascity (EGARCH) model was used in establishing the relationship between exchange rate volatility and stock market volatility. It was found that there is negative relationship between exchange rate volatility and stock market returns – a depreciation in the local currency leads to an increase in stock market returns in the long run. In all their studies, interest rate was used as a proxy of Treasury bill rate which this study turn to differ. This study used the lending rate as proxy of interest rate and Treasury bill rate as another independent variable in the study. The study differs from that of the reviewed literature in that the joint effects of Treasury bill rate and interest rate on stock market return were investigated. This suggest that there may be several economic factors that affect stock returns. After reviewing literatures relevant to this study, it was found that lots of empirical work has been done on finding relationship between macroeconomic indicators and stock prices for different countries with various results using APT models. One thing that has been consistent in all these findings is the fact that APT theory has been used. In this study the APT theory and cointegration test and VECM analytical model were also used because all the three techniques present a consistent result and give a very good understanding of dynamic relationship between macroeconomic variables in long run and short run equilibrium.

Materials and methods

Data

The data for study was mainly quantitative of monthly close of GSE All-share Index obtained from Ghana Stock Exchange and end of month lending rates as a proxy of interest rate and 3 months Treasury bill rate also obtained from Bank of Ghana Research Department. The sample period spans from January 1995 to December 2011 consisting 204 samples, and the data collected was treated statistically. The sample size period January 1995 to December 2011 was chosen because during this period Ghana stock markets have undergone substantial policy changes characterized by the revival of private foreign capital flows to emerging market economies, flexible exchange rates, strong economic growth, credit market crisis in the United States and new capital requirement by commercial banks. These changes have affected the movement in index and magnitude of volume trades in the market in different ways.

Market returns (R_t) was calculated from the monthly index price as follows:

$$R_t = ln\ (P_t/P_{t-1}) * 100\ \% \quad (1)$$

where, R_t = market return at period t; P_{t-1} = Index Price at period t; P_{t-1} = Index Price at period t-1; ln = natural log. This calculation of market return (Eq-1) was used in the efficiency test.

Models

The study employed a time series analysis to examine the impact of interest rate and Treasury bill rate on Ghana stock market returns. The principal method employed to analyze the time series behaviour of the data involved co-integration and the estimation of a Vector Error Correction Model (VECM). Further, the study employed the Johansen maximum likelihood procedure because both theoretical and empirical literature reviewed showed that these models are appropriate and have better and good finite sample properties than others (Gonzalo, 1994) and gives more efficient estimators of cointegrating vectors (Phillips, 1991).

Methods

Based on both theoretical and empirical literature reviewed, this study hypothesizes the model between Ghana Stock Exchange- All share index (GSE) and Treasury bill rate and interest rate, is hypothesized as follows:

$$GSE = f\ (TBR,\ IR) \quad (2)$$

where *GSE* is Ghana Stock Exchange – All share index, *f* = function, *TBR* = treasury bill rate and *IR* = interest rate. The data collected were analyzed using Econometric view (Eviews 7) software and the linear regression was run based on the models below:

Model (1): $LGSE = \beta_0 + \beta_1 LTBR + e_t \quad (3)$

Model (2): $LGSE = \beta_0 + \beta_1 LIR + e_t \quad (4)$

Model (3): $LTBR = \beta_0 + \beta_1 LIR + e_t \quad (5)$

Model (4): $LGSE = \beta_0 + \beta_1\ LIR + \beta_2 LTBR + e_t \quad (6)$

LGSE = stock market return rate, LIR= interest rate, LTBR = treasury bill rate, β_0 is constant, β_1 and β_{12} are the sensitivity of the variables to stock market returns and e_t is a stationary error correction term. The four questions which guided the study were (1) is there any relationship between stock market return and Treasury bill rate? (2) Is there any relationship between stock market return and interest rate? (3) Is there a relationship between interest rate and Treasury bill rate? (4) How does interest rate and Treasury bill rate jointly impact on stock market returns? To find answers to these questions Johansen's Multivariate Cointegration Model, Vector Error Correction Model (VECM) as well as Ordinary Least Squares (OLS) methods were used to investigate the effects. The data used has a monthly frequency and the sample runs from January 1995 until December 2011. The four hypotheses were formulated based on the models above as follows:

H1: There is a negative relationship between stock market returns and Treasury bill rate.

H2: There is a negative relationship between stock market returns and interest rate.

H3: There is a positive relationship between Treasury bill rate and interest rate.

H4: There is a joint negative relationship between Treasury bill rate and interest rate and stock market returns.

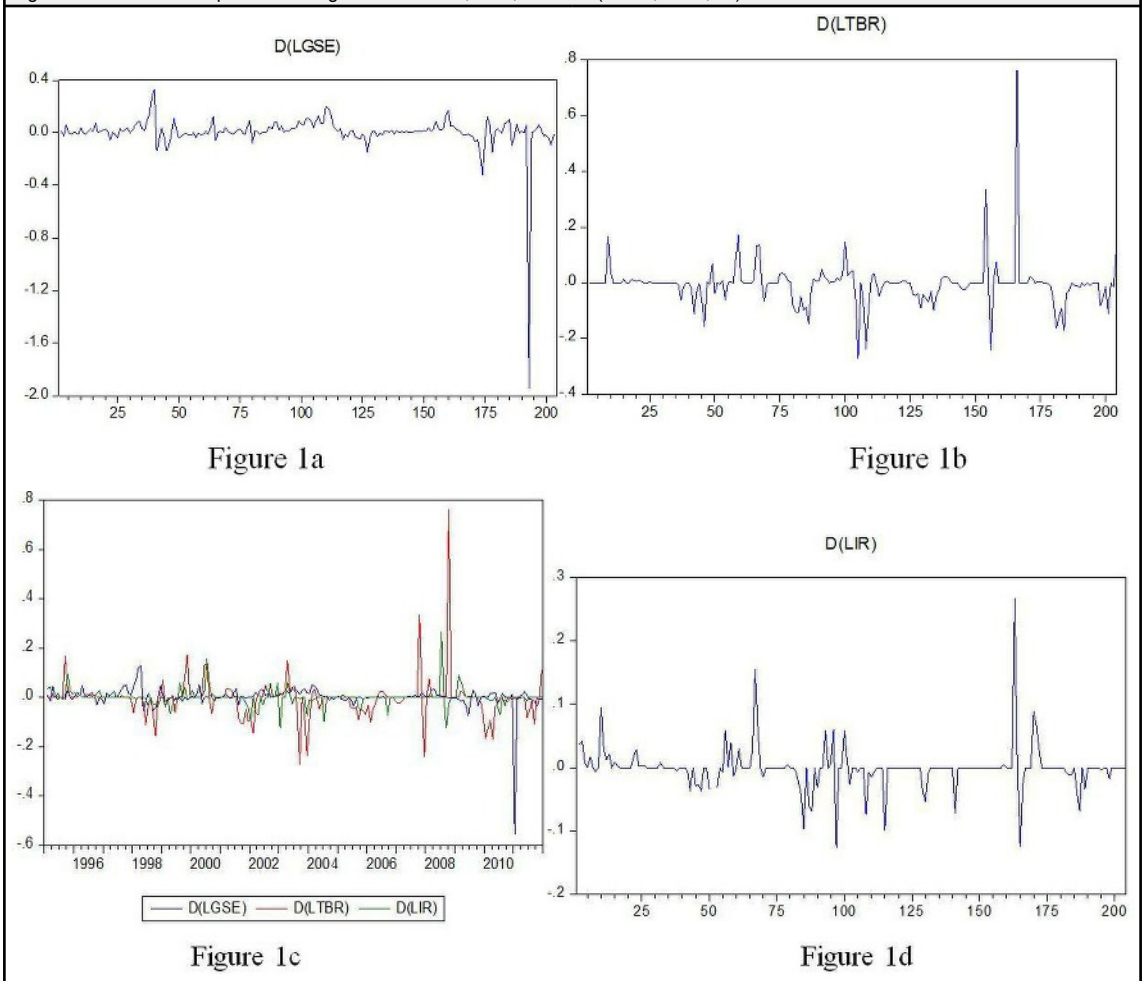
First, Microsoft excel was used to enter the data and the monthly returns and the index was computed. The computed stock returns, interest rate and Treasury bill rate were imported from Microsoft excel to Eview 7 software for the

actual analyses. Time series behaviour of the data of long-run equilibrium relationship and short-run dynamics among the variables were examined using Johansen-Juselius (1992) multivariate coinintegration test and the Vector Error Correction Model. The Augmented Dickey-Fuller test and Phillips-Perrons unit root test were used to test the stationarity of the series. The coefficient of determination was determined from the regression model to know how much variations are explained from the independent variables. In estimating the cointegration, Augmented Dickey-Fuller test and Phillips-Perrons unit root tests were used to determine whether each of the series is integrated of the same order. The number of co-integration ranks (r) was tested with the maximum eigenvalue and trace test. The maximum eigenvalue statistics used to test the null hypothesis state that there are r co-integrating vectors against the alternative of r+1 co-integrating vectors. The trace statistics tests of the null hypothesis of no cointegrating vector against the alternative of at least one cointegrating vector are the asymptotic critical values given in Johansen (1991) and MacKinnon-Haug-Michelis (1999). In all the analyses attention is focused on the objective of the study in analyzing the data where the objective of the study is to examine the joint impact of interest rate and Treasury bill rate on stock market returns.

Presentation of findings

Table 1 presents the descriptive statistics of the data, containing sample means, medians, maximums, minimums, standard deviations, skewness, kurtosis as well as the Jarque-Bera statistics and probabilities (p-values). As can be seen from Table 1, all the variables exhibit a positive mean return. Also the sum squared deviation row represents the net change over the sample period. It shows that the LTBR and LIR declined by about 202% and 80% respectively. In terms of skewness, GSE All share Index and interest rate have return distribution that are negatively skewed while the 91 day Treasury bill rate exhibit a positive skewness which implies that it has a fat right tails. Kurtosis value of LGSE and LTBR shows that data is not normally distributed because values of kurtosis are deviated from 3. The Jarque-Bera statistics and corresponding p-values were used to check for the normality assumption. Based on the Jarque-Bera statistics and p-values this assumption is rejected at 5 percent level of significance for LGSE and LTBR variables, with the only exception being the variable LIR. The descriptive statistics indicates that the values are not normally distributed about its mean and variance and therefore sensitive to speculation and periodic change. The graph in figures 1 a, b, c and d below are the Time Series plot of the logarithms of GSE, TBR, IR and

Figure 1: Time Series of plots of the logarithms of GSE, TBR, IR and D(LGSE,LTBR,LR)



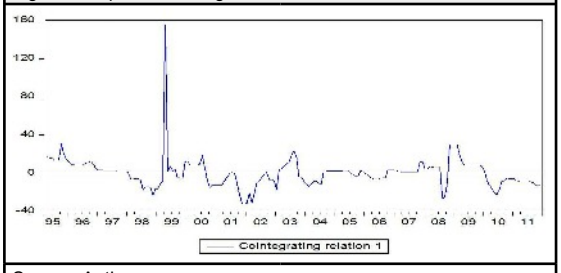
Source: Authors

D(LGSE,LTBR,LR). They reveal the volatility and speculative nature of the Ghana Stock market. They also reveal the kind of relationship that exists between the variables. They also show the trend of GSE, TBR, IR over the period January 1995 to December 2011 in natural logarithm. It is evident from figure 1a that LGSE shows a positive trend and increases over the years under review. However there were some fluctuations between the year 2004 and 2006. In the year 2008, it can be deduced that there were high returns from the stock market but reduced drastically from 2009 to 2010. The graphs in fig.1b and 1d give a negative slope as compared to the LGSE. The graph also peaks at specific years namely; 2001, 2003 and 2009. This can be attributed to the fact that at certain times between the years under review especially during the electioneering year and immediately after the general election in the country, the economy is usually not stable and thus results in high interest.

Table 3 shows the appropriate lag length of 4 for LR, FPE and AIC indicated by * (asterisk). From Table 3 the optimal lag length of 4 was chosen for the ADF test because lag 4 was the most efficient lag based on the lag order selection criterion. Table 4 illustrates the ADF unit root tests results which shows that the series are not stationary at levels but at first difference. Having established the lag length of 4 for LR, FPE and AIC and the ADF test indicating that the series are not stationary at levels but at first difference, we proceeded to test for the presence of long-run relationship among the variables by using Johansen's cointegration test technique. An intercept only is specified for the cointegration test. Both trace statistic and maximum eigenvalue statistic indicates one cointegrating vector at the 5% significance level (see Table 5a and 5b below). This indicates co-movement between stock market returns, Treasury bill rate and interest rate variables in a long-run equilibrium path. The cointegration graph presented in Figure 2 below confirms that there are more than “one” mean reversion effect in the cointegration vector over the period and signifies a good error correction behaviour in the cointegration system.

Given the evidence in favour of at least one cointegrating vector, the study can proceed to estimate the VECM to examine the short-run causal associations between the variables. The result of the VECM estimation is reported in Table 9.

Figure 2: A plot of cointegration vector normalized on DLGSE



Source: Authors

Table 6 shows a negative relationship between the dependent and independent variables. The regression coefficient (-0.007008) and t-statistic of -0.053187, indicate that the variables have 95.76% significant level. The value of the coefficient of correlation is (-0.007008) shows a weak negative correlation and the coefficient of determination (R) is 0.000014 means that variation of the Stock market returns cannot be explained by the Treasury bill rate. The level of significance is 95.7% and is greater than 5% significant level and this means it is not significant and may not necessarily be contributing to the variation in the stock market returns variable.

Hypothesis One: That there is a negative relationship between stock market returns and Treasury bill rate is therefore rejected because is not significant at 5% significant level.

The results in Table 7 shows a negative relationship between the dependent and the independent variable with regression coefficient (-0.020202) and t-statistics -0.064488. The value of the coefficient of correlation is -0.020202 which shows a very weak negative correlation, while the coefficient of determination (R^2) is 0.000021 means that about 0.0021% of the total variation is explained for by the interest rate and the remaining 99.9% is accounted for by other variables.

The level of significance is 94.86% and it is greater than 5% significant level and therefore not significant. The explanation is that the interest rate variable may not necessarily be contributing to the variation in the stock market returns.

Hypothesis Two: That there is a negative relationship between stock market returns and interest rate is therefore rejected because relationship is not significant at 5% significant level.

The result from Table 8 shows a positive relationship between the dependent and the independent variable with the coefficient of regression 0.055182 and t-statistics stood at 1.857877 with the implication that the variable is significant at 10%. The value of coefficient of correlation 0.055182 shows a weak positive correlation. The coefficient of determination (R^2) stood at 0.017050. This indicates that only 1.705% of the total variation is accounted for by the Treasury bill rate while the remaining 98.295% is accounted for by other variables. Though the value of the correlation co-efficient is small, the relationship is still significant at 10% level. The significant level shows that the Treasury bill rate may necessarily be contributing to the variation in the interest rate.

Hypothesis Three: That there is a positive relationship between Treasury bill rate and interest rate is therefore accepted at 10% significant level

Table 9 below shows the VECM for LGSE with significant error correction term in the GSE equation. The sign and magnitude of the error correction coefficient indicates the direction and speed of adjustment towards the long-run equilibrium path. It was found to be negative and significant. The negative sign implies that, in the absence of variation in the independent variables, the model’s deviation from the long run relation is corrected by increase in the dependent variable. Highly significant error correction term is an evidence of the presence of a stable long-term relationship. The estimated coefficient of the ECM (–1) is -0.580747 and p-value = 0.0000 suggesting that, in the absence of changes in other variables, deviation of the model from the long-term path is balanced by 58.074 per cent increase in GSE All Share index per month. This means that deviation from the long run relationship takes almost a month to be corrected. The fundamental regression statistics show that R2 (98.196%) is high implying that overall goodness of fit of the VEC model is satisfactory. The Durbin Watson Statistic (2.0) shows that there is no autocorrelation in the residuals. The F-statistic of 830.3939 with it corresponding p-value 0.000 suggests that Treasury bill rate and interest rate jointly impact on stock market returns. This means that the hypothesis four is accepted. The diagnostic test statistics

reported in Table 10 above indicates that the model passes serial correlation and heteroscedasticity test at the 5% but fail normality test.

The wald test statistics reported in Table 11 and Table 12 show that interest rate and Treasury bill rate does not impact on stock market returns in the short-run.

Hypothesis four: That there is a joint negative relationship between Treasury bill rate and interest rate on stock market return is accepted at 5% significant level.

Discussion of findings

The study examines the impact of interest rates and Treasury bill rate on stock market returns on Ghana Stock Exchange (GSE) over the period 1995-2011 using Johansen's multivariate cointegration techniques and Vector Error Correction Model. The hypotheses of the study are stated as follows:

H_1: There is a negative relationship between stock market returns and Treasury bill rate.

H_2: There is a negative relationship between stock market returns and interest rate.

H_3: There is a positive relationship between Treasury bill rate and interest rate.

H_4: There is a joint negative relationship between Treasury bill rate and interest rate and stock market returns.

The results clearly indicate a negative relationship but weak predictive power between LTBR and LGSE (Table 6) and between LIR and LGSE as well (Table 7) on the Ghana Stock Market performance. This result is consistent with the findings of Kuwornu and Owusu-Nantwi (2011), Gazi and Hisham (2010), Maghayereh, (2002) Tursoy et al. (2008), Yildirtan (2007), Maysami et al. (2004). The negative relationship between LTBR and LGSE can be explained by the discount rate effect or the risk-free rate factor. Though there is a negative relationship between stock market returns and Treasury bill rate (Table 6), the hypothesis one is rejected because the relationship is not significant. This means that Treasury bill rate may not necessarily be contributing to variations in the stock market returns variable. The shifting of funds between risky equity and Treasury bill by portfolio and fund managers is thus expected. This is because changes in Treasury bill rates impact on the theoretical value of companies and their shares via the changes in required rate of return. When Treasury bill rate is high, rational investors would tend to invest in less risky assets with high returns. The negative relationship between LGSE and LIR implies that as interest rate increases, stock market returns decreases. The reason is that investors will invest in businesses with good profit and quick turnover while being risk averse. When this happens the size of the stock market reduces due to the fact that security prices will fall. Hence, economic growth and development will decline because industries are not able to borrow for long term. As interest rate is increased, investors will prefer to invest in the fixed deposit and Treasury bills than to invest in the stock market and this will mean that we have investor with short term focus.

Though there is a negative relationship between stock market return and interest rate (Table 7), the hypothesis two is rejected because the relationship is not significant. This means that interest rate may not necessarily be contributing to variations in the stock market returns variable. It fail to support the findings of Kyereboah-Coleman and Agyire-Tettey (2008), Adam and Tweneboah (2008), Muradoglu and Metin (1996), Humpe and Macmillan (2007), Abugri (2008), Al-Sharkas (2004), Maysami et al. (2004), Kandir (2008) and Ozturk (2008) that there is a significant negative relationship between stock market performance and interest rate or treasury bill. These suggest that macroeconomic factors that affect stock market are not static but changes as the economy changes and that investors should be monitoring what factors are impacting the stock market and the economy changes. The weak negative relationship may also imply that investors are becoming long term investors which are good for the stock market and the economy in general. It also suggests that the market is becoming efficient and therefore incorporate Treasury bill and interest rate into security prices. The results clearly indicate a positive relationship between the interest rate and Treasury bill rate and is significant at 5% significant level (Table 8) and therefore hypothesis three is accepted. The positive relationship and small R^2 implies that the pricing of interest rate depends on several factors such as demand and supply of money, rate of inflation, growth rate of the economy, default rate, creditworthiness etc. which are not captured in the study. It also means that the Treasury bill rate is the base in determining interest rate. When Treasury bill rate goes up, interest rate goes up and therefore affects capital and operational cost of industries. This replicates itself in a weak economy and retard growth and development. However, when Treasury bill rate goes down, interest rate also goes down and therefore industries and investors will borrow more to invest in the stock market which replicates in a booming and growth economy. The results of the Augmented Dickey Fuller tests reveal that time series variables are stationary at first difference and the result of Johansen's cointegration technique clearly shows that there is at least one cointegrating factor. Trace statistic (Table 5a) and the maximum eigenvalue statistic (Table 5b) indicate one cointegrating vector at the 5% significance level. This indicates that Treasury bill rate and interest rate are cointegrated or has long term relationship. These findings are consistent with the findings of Harasty and Roulet (2000), Maysami and Sims (2002), Chong and Koh (2003), Islam (2003), Tan et al., (2006), Mahmood and Dinniah (2009), Gazi and Hisham (2010), and Ahmet (2012). The result indicates that Treasury bill rate (Table 11) and interest rate (Table12) are not significantly different from zero, meaning that the factors have no short-run association or effect on stock market returns. Both Treasury bill rate and interest rate are independently not statistically significant at 5 percent level in explaining the variation in the performance of the GSE (Table 9). The interest rate having a negative coefficient supports the assumption that high interest rates, increases the cost of operation of firms listed on the exchange and therefore makes the shares of these firms less attractive. High-interest rates and excessive borrowing by government turn to crowd out the private sector; this does not helped the private sector and specifically the GSE to develop over the years. The coefficient of 21.68% means that high-interest rates negatively affecting businesses in Ghana and also shows that when there is an increase in the interest rate by 1 percent, the GSE performance declines by 2.45 percent. This does not promote the private sector which all successive government has talked about therefore prudent programmes and policies must be adopted to ensure a steady decline in interest rates. The lag of interest rate affect the performance of the market implies that it takes time for investors to adjust their portfolio due to the lagging effect. The result indicates that increase in the cost of operation of firms through high interest rate makes the stock market less attractive and that reduces investors' confidence in the market. It was expected that interest rate and Treasury bill rate independently contribute to stock market returns this

is not the case as shown by the results. The ECM term is negative and significant at 5 percent level (Table 9). It indicates the validity of a stable error correction mechanism which eventually converges to the long-run equilibrium level. The negative coefficient of the error correction model term (ECM) confirms the validity of long-run equilibrium relationship of the model. The speed of adjustment to the long run equilibrium level is 58 percent as shown by the coefficient of the ECM (Table 9). This means that 58 percent of any previous disequilibrium in the long run will be corrected in the short term. The results clearly indicate that Treasury bill rate and interest rate jointly impact on stock market returns (Table 9) hence hypothesis four is accepted. This means that fund managers and investors should be watching the two together in making portfolio rebalancing decision.

Conclusion

The study examines the effect of macroeconomic variables on the stock market returns in Ghana using monthly data from January 1995 to December 2011. Ghana Stock Exchange- All share Index (GSE) is used as a proxy for the performance of the Ghana stock market. Two macroeconomic variables, interest rate and Treasury bill rate which were hypothesized to influence stock market returns were examined with multiple regression model to test the relationships between the GSE-All share index returns and the two macroeconomic factors. The study also explored the long run relationship between the two variables using Johansen's multivariate cointegration tests. The cointegration analysis provides evidence in support of a long-run relationship between the variables over the time horizon. Contrary to the stated hypotheses, the study finds a weak negative relationship between interest rate and stock market returns and a weak negative relationship between Treasury bill rate and stock market returns as well. The hypotheses one and two are rejected at 5% significant level. It was found that interest rate and Treasury bill rate independently does not contribute or explained the variation in the stock market performance. The hypothesis that interest rate and Treasury bill rate is positively correlated was accepted at the 5% significant level which means interest rate and Treasury bill rate jointly impact on stock market returns in the long-run. It can therefore be concluded that the GSE market, Treasury bill rate and Interest rate seem to move independently, although there is some evidence showing an existence of a long-run equilibrium relationship between the variables. Policy-makers need to be careful too when trying to influence the economy through changes in macroeconomic variables such as interest rates, or Treasury bill rate. Overall, this study is expected to be useful for both stock investors, portfolio managers and finance literature.

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Table 1: Descriptive statistics of the variables

Statistic	Variables		
	LGSE	LTBR	LIR
Mean	3.154601	2.131377	2.846319
Median	2.770876	2.149167	2.812500
Maximum	4.946274	3.895833	3.979167
Minimum	1.339498	0.771667	0.000000
Std. Dev.	1.146642	0.999472	0.631021
Skewness	-0.008624	0.148131	-0.155693
Kurtosis	1.545352	1.633218	3.600758
Jarque-Bera	17.98854	16.62485	3.891911
Probability	0.00124*	0.00245*	0.142851
Sum	643.5386	434.8008	580.6492
Sum Sq. Dev.	266.9019	202.7858	80.83195
Observations	204	204	204

Source: Asterisk (*) denotes the null of normality was rejected at 5% significance level

Table 2: Correlation of variables

		D(LGSE)	D(LTBR)	D(LIR)
D(GSE)	Pearson Correlation	1	-0.003751487	-0.004571413
	Sig. (1-tailed)		0.478817914	0.474323043
	N	204	204	204
D(LTBR)	Pearson Correlation	-0.003751487	1	0.130573855
	Sig. (1-tailed)	0.478817914		0.032331834
	N	204	204	204
D(LIR)	Pearson Correlation	-0.004571413	0.130573855	1
	Sig. (1-tailed)	0.474323043	0.032331834	
	N	204	204	204

**. Correlation is significant at the 0.01 level (1 tailed).

Source: Asterisk (*) denotes the null of normality was rejected at 5% significance level

Table 5a: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.141687	40.57016	29.79707	0.0020
At most 1	0.038276	11.08237	15.49471	0.2065
At most 2	0.018225	3.549924	3.841466	0.0595

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Authors

Table 3: Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC
0	-138.2660	NA	0.000909	1.510867	1.562703
1	666.9939	1576.070	1.82e-07	-7.005283	-6.797939*
2	676.2334	17.78724	1.82e-07	-7.007844	-6.644992
3	678.7917	4.842942	1.95e-07	-6.938948	-6.420589
4	698.1366	36.00023*	1.74e-07*	-7.049590*	-6.375722
5	700.8703	4.999513	1.86e-07	-6.982570	-6.153194
6	702.8369	3.533648	2.01e-07	-6.907347	-5.922463
7	707.1282	7.572756	2.12e-07	-6.856986	-5.716594
8	713.2871	10.67114	2.19e-07	-6.826600	-5.530701

* 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

Source: Authors

Table 4: Augmented Dickey-Fuller (ADF) Unit Root Test

Variables	Levels (Intercept Only)			First Difference (Intercept Only)		
	Sig. Level (%)	t-statistics	Prob.*	Sig. Level (%)	t-statistic	Prob.*
ADF test statistics	–	-1.52484	0.5191		-13.1317	0.000
LGSE	1	-3.46257		1	-3.46274	
	5	-2.87561		5	-2.87568	
	10	-2.57435		10	-2.57439	
ADF test statistics	–	-1.302733	0.6284		-10.1105	0.000
LTBR	1	-3.46274		1	-3.46274	
	5	-2.87568		5	-2.87568	
	10	-2.57439		10	-2.57439	
ADF test statistics	–	-1.71569	0.4218		-14.9906	0.000
LIR	1	-3.4629		1	-3.4629	
	5	-2.87575		5	-2.87575	
	10	-2.57442		10	-2.57442	

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

Source: Authors

Table 5b: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.141687	29.48779	21.13162	0.0027
At most 1	0.038276	7.532450	14.26460	0.4282
At most 2	0.018225	3.549924	3.841466	0.0595

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Authors

Table 6: Regression Coefficients: Treasury bill on Stock Returns

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.005723	0.010722	0.533782	0.5941
D(LTBR)	-0.007008	0.131753	-0.053187	0.9576
R-squared	0.000014	Mean dependent var		0.005764
Adjusted R-squared	-0.004961	S.D. dependent var		0.152015
S.E. of regression	0.152392	Akaike info criterion		-0.914917
Sum squared resid	4.667891	Schwarz criterion		-0.882275
Log likelihood	94.86409	Hannan-Quinn criter.		-0.901711
F-statistic	0.002829	Durbin-Watson stat		1.855510

Source: Authors

Table 7: Regression Coefficients: Interest rate on Stock market returns

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.006010	0.010802	0.556352	0.5786
D(LIR)	-0.020202	0.313271	-0.064488	0.9486
R-squared	0.000021	Mean dependent var		0.006020
Adjusted R-squared	-0.005004	S.D. dependent var		0.152748
S.E. of regression	0.153130	Akaike info criterion		-0.905157
Sum squared resid	4.666318	Schwarz criterion		-0.872288
Log likelihood	92.96827	Hannan-Quinn criter.		-0.891857
F-statistic	0.004159	Durbin-Watson stat		1.865534

Source: Authors

Table 8: Regression Coefficients: Interest rate on Treasury bill rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000183	0.002429	-0.075368	0.9400
D(LTBR)	0.055182	0.029702	1.857877	0.0647
R-squared	0.017050	Mean dependent var		-0.000501
Adjusted R-squared	0.012110	S.D. dependent var		0.034564
S.E. of regression	0.034354	Akaike info criterion		-3.894285
Sum squared resid	0.234862	Schwarz criterion		-3.861416
Log likelihood	393.3756	Hannan-Quinn criter.		-3.880985
F-statistic	3.451707	Durbin-Watson stat		1.679647
Prob(F-statistic)	0.064664			

Source: Authors

Table 9: VECM estimation for LGSE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ΔLGSEt-1	1.049363	0.073748	14.22903	0.0000**
ΔLGSEt-2	-0.041397	0.106991	-0.386922	0.6993
ΔLGSEt-3	0.002093	0.107005	0.019558	0.9844
ΔLGSEt-4	-0.025817	0.074161	-0.34812	0.7281
ΔLTBRt-1	0.018843	0.143238	0.131549	0.8955
ΔLTBRt-2	-0.076845	0.224321	-0.342569	0.7323
ΔLTBRt-3	0.038251	0.223734	0.170966	0.8644
ΔLTBRt-4	0.073129	0.157143	0.465363	0.6422
ΔLIRt-1	-0.216893	0.371174	-0.584345	0.5597
ΔLIRt-2	-0.019489	0.516595	-0.037726	0.9699
ΔLIRt-3	-0.114139	0.519244	-0.219817	0.8263
ΔLIRt-4	0.228843	0.335929	0.681225	0.4966
C	0.146170	0.182786	0.799675	0.4249
ECM(-1)	-0.580747	0.090625	-6.408266	0.0000**
R-squared	0.981966		Prob(F-statistic)	0.0000**
Adjusted R-squared	0.980784		Durbin-Watson statistic	2.011464
F-statistic	830.3939			

** means significance at 5% level

Source: Authors

Table 10: VECM Model Diagnostic Tests

Serial Correlation	F(2,197)=0.780126[0.4598]
Heteroskedasticity	F(12,183)=0.193894[0.9986]
Normality	X2 (2)=105565.0[0.0000]

Source: Authors

Table 11: Short-run relationship between stock market returns and Treasury bill rate

Test Statistic	Value	df	Probability
t-statistic	-0.054190	183	0.9568
F-statistic	0.002937	(1, 183)	0.9568
Chi-square	0.002937	1	0.9568
Null Hypothesis: $\Delta LTBR_{t-1}$-$\Delta LTBR_{t-2}$-$\Delta LTBR_{t-3}$-$\Delta LTBR_{t-4}$=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
$\Delta LTBR_{t-1}$-$\Delta LTBR_{t-2}$-$\Delta LTBR_{t-3}$-$\Delta LTBR_{t-4}$		-0.015691	0.289564
Restrictions are linear in coefficients.			

Source: Authors

Table 12: Short-run relationship between stock market returns and Interest Rate

Test Statistic	Value	df	Probability
t-statistic	-0.454444	183	0.6500
F-statistic	0.206520	(1, 183)	0.6500
Chi-square	0.206520	1	0.6495
Null Hypothesis: ΔLIR_{t-1}-ΔLIR_{t-2}-ΔLIR_{t-3}-ΔLIR_{t-4}=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
ΔLIR_{t-1}-ΔLIR_{t-2}-ΔLIR_{t-3}-ΔLIR_{t-4}		-0.312109	0.686793
Restrictions are linear in coefficients.			

Source: Authors