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The Short and Long Run Dynamic Effect of Macroeconomic Fundamentals on Stock Market

Performance: Evidence from Ghana

By

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DECLARATION

I hereby declare that this research thesis is my own work towards the award of Master of Business Administration (Finance Option) and that to the best of my knowledge, it entails no material previously published by another person nor material which has been accepted for the award of any other degree of the University or any university elsewhere, except where due acknowledgement has been made in the text.

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DEDICATION

I dedicate this work to the Almighty God for seeing me through the success of this work, and to

my family and friends who encouraged and inspired me to pursue this program.

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First and foremost, I am very grateful to the Almighty God for His mercies and blessings towards me.

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Final thanks goes to all who helped me in diverse ways to complete this thesis, God bless you all.
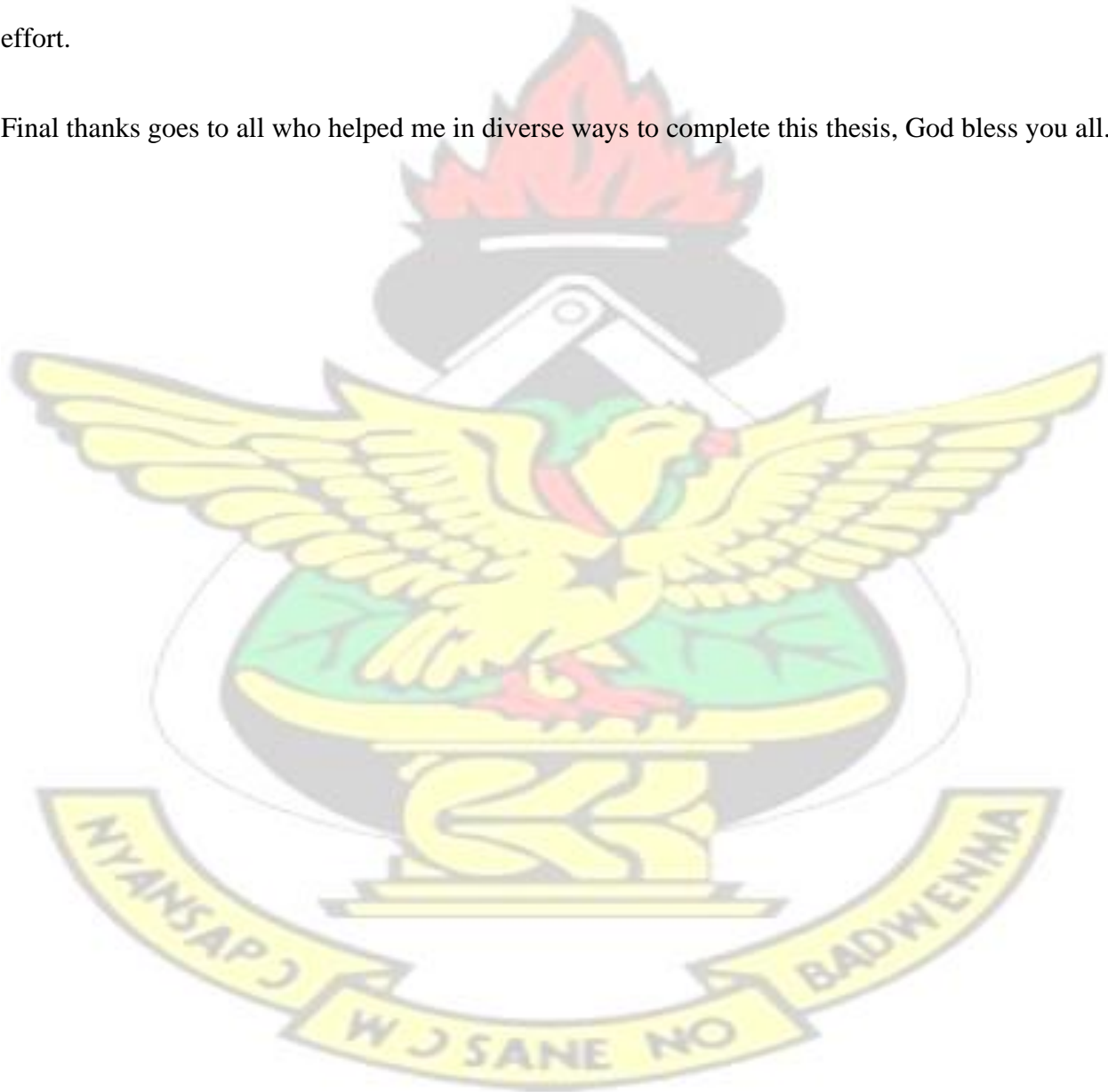
Abstract

This study focused on examining the impact macroeconomic fundamentals have on the performance of the Ghanaian stock market in both the short and long run. The study utilized an autoregressive distributed lag (ARDL) model to analyse monthly data covering the period September 2005 to December 2017 in a bid to understand how macroeconomic fundamentals including money supply, inflation, interest rates and exchange rates explain the movements in Ghana's stock market returns. The results from the long run analysis revealed that both interest rates and exchange rates share negative significant long run relationships with Ghana's stock market returns. Further, the results suggest that expansionary monetary policies in Ghana exert upward pressures on stock prices and by extension market returns. Trade volume employed to proxy market liquidity as a control is also observed to share a significant positive relationship with market returns. The short run analysis using the error correction representation found only interest rate to have a significant positive association with market performance in the short run. The results generally suggest that changes in macroeconomic factors such as interest rates, exchange rates and money supply significantly influence the direction of stock return movements in Ghana's market giving the implication that changes in interest rates, exchange rate and money supply should generally be considered in making investment decisions in the Ghanaian market. Having made these findings, the study recommends that policy makers frame macroeconomic policies that will appreciate and stabilize the Ghana cedi and during periods of low economic activity, provide some form of economic stimulus by reducing interest rates or increasing money supply so as to ensure stability and enhance market performance.
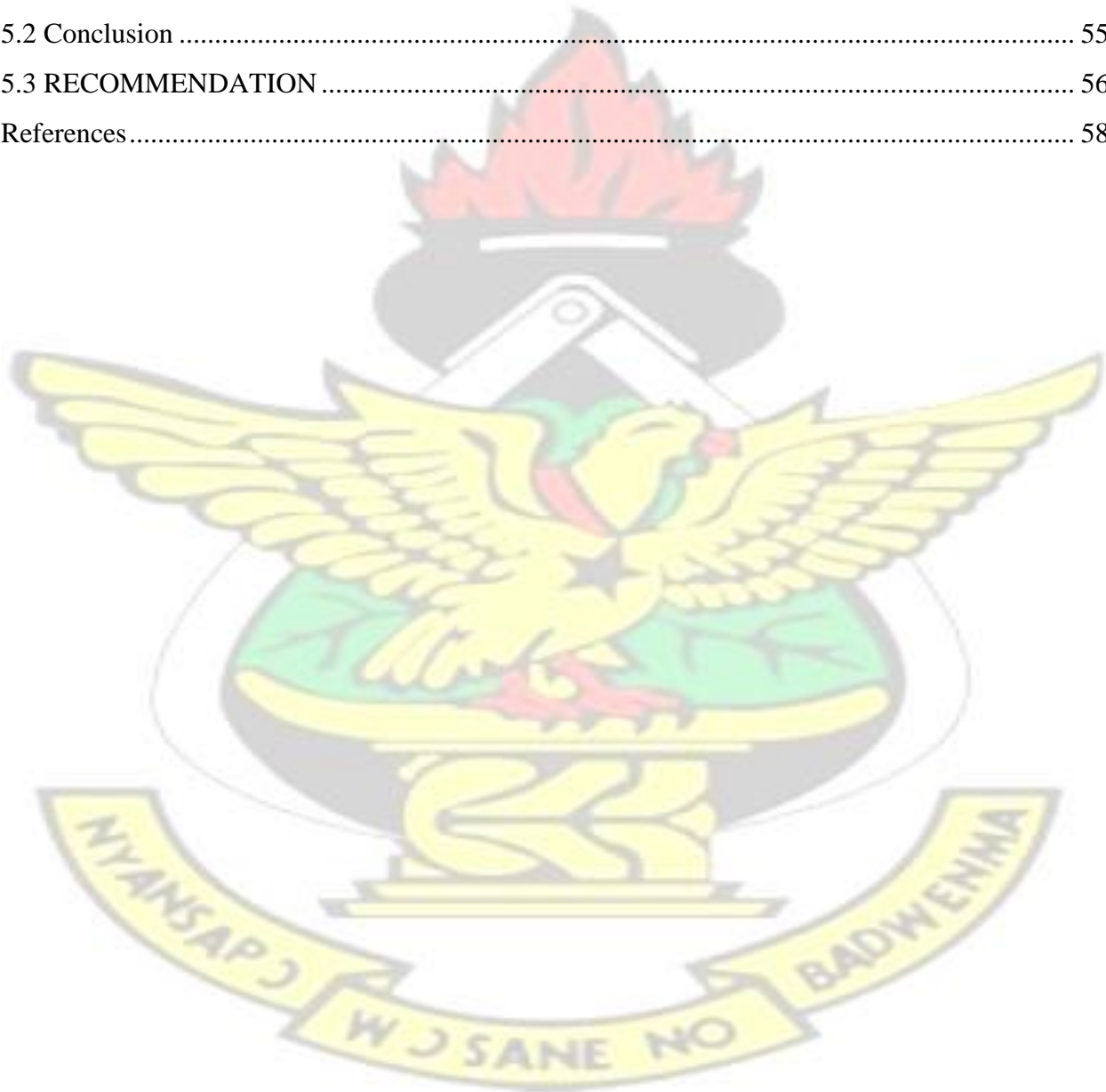
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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The significance of the equity market cannot be downplayed in the modern economy due to its critical role in mediating the transfer of scarce financial resources between lending units and borrowing units. A well-functioning equity market may therefore promote the developmental process in an economy through two relevant mediums: enhancing savings as well as overseeing the efficient allocation of scarce loanable funds. The levels of savings in an economy are perceived to improve with the presence of equity markets as these markets possess the capacity to provide households with a variety of securities that meet their liquidity needs and risk preferences (Kumari and Mahakud, 2015). Also, founded on the fundamental concept of price mechanism, a well operational equity market should value the equity of a profitable firm highly than that of an unprofitable firm. Price mechanism thus ensure that available and future financial resources are efficiently allocated to their most productive use in that capital cost for profitable firms will be lower relative to unprofitable firms (Cheng and Yip, 2017).

The Ghana Stock Exchange was established after several recommendations during the economic reforms of the 1980's to essentially facilitate economic growth and sustainable development. The Ghanaian government after several years of experimenting a plethora of state interventions towards economic growth came to the realization that the achievement of a more dynamic economic growth required the assignment of a bigger role to the private sector and its attendant equity markets (Boateng, 2004). The unique capacity of equity markets in boosting access to funds makes their growth and sustainability relevant to the governments worldwide. Sohail and Hussain

(2009) in explaining the relevance of equity markets in mobilizing resources for their productive use, point out that equity markets must have a significant nexus with domestic economic activity in order to effectively perform this function.

Due to the relevance of macroeconomic factors in the determination of general market risk and firm cash flows, assessing the nature of relationship between the stock market behaviour and macroeconomic fundamentals is instinctively interesting (Arnold and Vrugt, 2006). Theoretical postulations such as the arbitrage pricing theory and the dividend discount framework demonstrate the roles macroeconomic factors such as inflation and interest rates among others play in influencing stock value movement. These models forecast that the arrival of any expected or unexpected novel information regarding macroeconomic factors will influence the behavior of stock values through the channels of the discount rate, anticipated dividends or both. A thorough comprehension of the nature of association between economic activity and equity market movements will be beneficial especially to policy makers, investors as well as key market participants. Whilst investors perceive stocks as securities that provide them protection against the adverse effects of inflation, policymakers are interested in identifying factors that could potentially influence equity market behaviour (Kumari and Mahakud, 2015). The identification of these factors will be useful in aiding policymakers in the formulation of effective policies that will create a stable financial and macroeconomic environment to help in the growth and development of local companies. In the valuation of securities for asset selection, market participants such as fund managers and investment bankers will also be interested in understanding how movements in the country's macroeconomic factors relate with the value of equity.

Studies that have focused on the association between equity market behaviour and movements in macroeconomic variables can be classified into two main groups. Studies in the first class examine the nexus at first moments (Ndlovu et al., 2018; Fama, 1981; Sadorsky, 1999; Vuyyuri, 2005). This first set of studies examine how equity price movements are related to macroeconomic factors in their mean with the use of econometric techniques like multivariate cointegration, vector error correction model, Granger causality and other vector autoregressive models. Regardless of the many distinct methods applied in assessing the relationship in different countries, movements in macroeconomic factors have widely been identified to have some significant influence on equity values. Empirical findings on the nature of their nexus have however been contradictory especially for developing countries. For example, Omotor (2010) uses cointegration analysis to surprisingly discover that changes in inflation rates are positively related to the performance of Nigerian equities. They argue that this is an indication that investors are being compensated for by inflationary pressures. Applying multiple regression analysis however, Gwahula (2018) finds that market returns have no significant relationship with inflation rates in Tanzania. Coetzee (2002) uses data of quarterly periodicity spanning a decade from 1991 to 2001 to find that movements in inflation rates have a significant negative influence on equity prices in both the short and the long term. The second set of literature builds on the previous studies and analyzes the nexus between macroeconmic factors and the equity market in their variance. The concentration of these studies is on how the risks associated with movements in macroeconomic fundamentals influence stock market return fluctuations utilizing volatility models (Fraser and Power, 1997; Morelli, 2002; Choudhry, Papadimitriou, and Shabi, 2016). The rationale here is that due to the strong association between the equity market and macroeconomic factors, any change in economic activity will act as a source of systematic risk that will influence all portfolios in the market (Chowdhury et al.,

2016). The findings of Fraser and Power (1997) provide compelling evidence to corroborate the assertion that conditional equity market volatility is dependent on the speed of information arrival in US, UK and Pacific Rim equity markets. In similar fashion, Morelli (2002) uses the generalized autoregressive conditional heteroskedastic model as well as VAR models to find that fluctuations in economic factors have a restricted effect on the UK market's conditional volatility. Chowdhury et al., (2016) also use an autoregressive vector model and a seasonally adjusted forecast model to establish a one-way influence of economic uncertainties on the volatility of the Bangladesh equity market.

With the above discussion in mind, the current study specifically examines how changes in the rate of macroeconomic factors such as money supply, interest rates, inflation and exchange rates affect the performance of the Ghanaian equity market. In addition to contributing to the emerging literature on the mean level association between the equity market and macroeconomic factors, this study additionally contributes by extending the extant relevant studies for African markets in several ways. Firstly, the data employed for this study is relatively more recent. This is essential as Ghana's equity market continues to experience technical reforms, which are likely to increase the market's efficiency, thereby improving the reaction of the market to various macroeconomic conditions. Unlike other key studies on African markets such as Diebold and Yilmaz (2007), who employ data of quarterly periodicity for South Africa, the current study utilizes data of monthly periodicity, which better reflects the Ghanaian market's reaction to macroeconomic factors as this market has been empirically found efficient at least in the weak form (Adjasi, 2009).

1.2 Problem Statement

In the era immediately following independence, African economies chose a state-sponsored development path, which meant that a relatively insignificant role was assigned to private enterprise. However, this door to economic development was closed in the 1980s following the debt and portfolio crisis faced by development financial institutions, causing a shift to market capitalism with associated stock markets (Nlurinde and Kariisa-Kasa, 1997; Caprio and Demirgüc-Kunt, 1998). Over the past two decades, Africa has undergone a paradigm shift of economic development towards private sector approaches for mobilizing investment funds for economic growth and sustainable development (Guru and Yadev, 2019). As a result, equity markets have become an important channel through which long-term financing is obtained in many African countries. In an effort to improve the mobilization of funds through the Ghanaian market, it is imperative to identify the factors that influence market performance in Ghana in order to formulate policies that create an atmosphere conducive for the appropriate functioning of the Ghanaian market.

Although knowledge about equity performance has accumulated in emerging market economies like Asia and Latin America (Boubaker and Raza, 2017; Bagchi, 2017; Hasan and Javed, 2009), markets in Africa continue to elude the attention of most researchers with only a handful of studies having considered this topic. A quick review of the literature confirms the paucity of published academic papers and the limited range of empirical techniques employed (Barakat, Elgazzar, & Hanafy, 2015; Vena, 2014; Lawal et al. 2018).

In Ghana, studies concerning the equity market have often focused on the efficiency of the Ghanaian market (Attafuah, 2020; Ayentimi, Mensah and Naa-Idar, 2013; Frimpong and Otenh-Abayie, 2007) and how macroeconomic uncertainty influences stock-price volatility (Adjasi, 2009). The study of Kyereboah-Coleman and Agyire-Tettey (2008) which examines the impact macroeconomic fundamentals on the performance of the Ghana stock exchange for the period spanning 1991 to 2005 is closely related to this study. However, aside from the fact that the study's sampling period is already out of date, another possible limitation of the study stems from the fact that it uses quarterly data which is disadvantaged in its capacity to better reflect market response to changes in economic factors. As the Ghanaian market has undergone major structural changes since the 1990s, the current study stands out by considering more recent data. Furthermore, although studies in developed economies and other emerging economies have tested the hypothesis that the influence of macroeconomic factors on stock market performance strengthens during times of crisis, no such tests have been carried out in the African context, to the author's best knowledge (Stock and Watson, 2002; Beltratti and Morana, 2006). As such, this study intends to conduct sub-period analysis using the 2007-2009 financial crises as a standard. Therefore, the prevailing discussion aims to fill these important gaps in the empirical and theoretical literature.

1.3 Research Objectives

This study seeks to examine the impact of macroeconomic fundamentals on Ghana's equity market performance.

The specific objectives of the study are stated as follows:

1. To examine the nature of short run relationships between macroeconomic fundamentals and Ghana's equity market returns.

2. To examine the nature of long run relationships between macroeconomic fundamentals and Ghana's equity market returns.

1.4 Research Questions

1. Do Ghana's equity market returns share short run relationships with macroeconomic fundamentals?

2. Do Ghana's equity market returns share long run relationships with macroeconomic fundamentals?

1.5 Significance of the Study

A number of important contributions are expected to be made by this study to the extant literature. From an empirical point of view, the study's policy recommendations will help policymakers formulate sound policies and set economic targets that will boost investor confidence and drive investment decisions. The resultant increase in investment in the Ghanaian market will enhance the growth and development of the Ghanaian economy and, by extension, African financial development. The efficient market hypothesis implies that portfolio diversification benefits from a low correlation between equity indices and all relevant information that is publicly available. In this sense, this study is also significant for shareholders and portfolio managers in the diversification of their portfolios. In theory, the study aims to contribute to the existing literature on how changes in the general macroeconomic environment affect movements in stock returns in

developing economies. The empirical results of the study can also be used to predict stock prices, as demonstrated by the study by Patra and Poshakwale (2006). This offers investors the opportunity to make informed decisions based on changes in macroeconomic dynamics. Finally, the study can also contribute by considering the nature of the relationship found between share prices and economic activity. The forecasting capacity of policymakers will be enhanced with the findings of this study as they may be able to forecast both expansions and contractions with a good level of confidence.

1.6 Brief Research Methodology

The study examines how changes in domestic economic factors affect the performance of Ghana's equity market within a sample period spanning January 2004 to December 2018. As such, monthly data on the Ghana stock exchange composite index is collected and used in the estimation of monthly stock market returns in the study. The macroeconomic factors used in the study are money supply, interest rates, inflation rates and exchange rate. Control variables including market liquidity and market size are adopted to help explain movements in market performance that may not be explained by the economic factors. Variables are selected based on their theoretical and empirical relevance for equity indices, as corroborated by existing literature (Morelli, 2002; Gan et al., 2006; Chinzara, 2011; Hsing and Hsieh, 2012; Su et al., 2014; Kumari and Mahakud, 2015). An explanatory research design is adopted to examine the relationship under investigation. The monthly stock index data used in the study is extracted from the Ghana Stock Exchange data repository. All other economic factors are acquired from the International Financial Statistics (IFS) of the International Monetary Fund. The study uses the autoregressive distributed lags (ARDL)

econometric technique to examine the dynamic short-term and long-term relationships of interest in an attempt to answer the research questions posed.

1.7 Scope and Limitation of the Study

The study uses historical data covering the period spanning January 2004 to December 2018. The study considers only the stock market of Ghana and, as such, uses the composite index of the Ghana Stock Exchange and domestic macroeconomic factors specific to Ghana. The use of the main stock index means that the stock returns of the different companies listed on the market are not considered separately, but rather the composite index is used as a proxy for the aggregate movements in stock returns. The implication of this approach is that the study results have limited generalizability to individual equities. The study, aside the macroeconomic variables outlined, eliminated variables such as industrial production, the effectiveness of legal institutions, corruption and the consequences of political instability all of which have a tendency to influence stock market returns.

1.8 Organization of Chapters

This thesis is divided into five chapters. The first chapter introduces the research topic and provides a brief review of the study. Problem statement, research objectives and research questions follow. It ends with the relevance of the study, the scope and limits and the organization of the thesis. Chapter two covers the literature review. It presents the theoretical background that connects the stock market with economic theory and discusses the related empirical studies available in the literature and highlights those studies that have implemented the same methods adopted in this research. The third chapter describes the methodology that will be used to address the research

questions. It describes the data collection process and then explains the statistical analysis methods that will be used, as well as the methods for estimating the variables. The results of the study will be presented in Chapter Four. It will describe the data and present the empirical results. Then the results will be analyzed, interpreted and discussed. Chapter five reviews the research questions of the study based on the findings and conclude on them. Finally, a series of recommendations for further studies will be offered.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter begins with a review of concepts related to stock market performance specifically discussing the risk-return tradeoff. The chapter continues with a review of theories that attempt to explain how market performance reacts to changes in macroeconomic variables. The theories of focus in this study include the efficient market hypothesis (EMH) and the arbitrage pricing theory (APT). Prior studies that have considered the nexus between economic fundamentals and equity market performance are reviewed thereafter before the chapter concludes with a presentation of the conceptual framework for the study.

2.1 Conceptual Review

2.1.1 Stocks

Stocks are among the various asset classes used by investors to invest their funds. A stock is the right of ownership in a company. Stocks are mainly classified into two types as identified by Gitman (2004). These are common and preferred stocks. Common stock holders have an ownership claim against the productive assets of the firm and are entitled to the firm's residual earnings. Preference stocks differ from common stocks in giving the holder preferential rights to receive a share of annual profits. Stocks are purchased by investors for various reasons. The interest of certain classes of investors is in the firm's long run growth whilst the interest of other classes is in receiving periodic dividend payments on their stocks. The profit received by stockholders on their investment either in the form dividends or changes in stock prices is referred

to as the stock return. Stock returns will however for the purposes of this study only refer to the change in the prices of stocks.

2.1.2 Risk and Return

The tradeoff between risk and expected return is an important concept in finance and investment. The risk-return tradeoff suggests that an increase in the risk on an investment should provoke an increase in expected return on the investment. As such, risk averse investors should expect to receive relatively lower levels of returns on their investments than risk lovers who prepared to assume higher levels of risk. This means that the higher an investor's tolerance is for risk, the higher the expected return on an investment will be. The tradeoff between expected return and risk is described in the study of Ghysels et al. (2005) as the "first fundamental law of finance". Using the MIDAS estimation technique, they found that expected return and risk are positively related. The authors argue that their findings are more conclusive on the nature of relationship existing between expected return and risk due to the relative superiority of the method used in their study compared to similar studies (Ghysels et al., 2005). In support of the findings of Ghysels et al., (2005), a positive relationship is also found by Hui and Whitelaw (2006) using the ICAPM methodology. As this study seeks to explain the changes in the performance of Ghana's stock market, the risk-return tradeoff is useful as it enhances our understanding of how risk is perceived in the Ghanaian market and how it affects the returns or performance of the market.

2.2 Theoretical Review

This section reviews the theories that underpin this current study. The study reviews the theory of efficient markets (EMH) as well as the arbitrage pricing theory (APT).

2.2.1 Efficient Market Hypotheses (EMH)

The basic idea behind Fama's (1965, 1970) EMH is that security prices account for every available information promptly so that supernormal profits can't be generated regardless of the investment strategies used. It is possible to explain the EMH formally using the following equation:

$$\Omega^*{}_t = \Omega_t \qquad\qquad (2.1)$$

The left side of the equation denotes a set of significant information at the period "t". The alternate side denotes the collection of data utilized for the pricing of securities, "t". The two sides being equivalent provides prove that the hypothesis is true and that a particular market is efficient. On the basis of information availability, Fama (1970) described three distinct kinds of market efficiency. In the first instance, Fama (1970) described some markets to be weak form efficient meaning that in those markets, security prices today account for all significant bygone information. Equity prices in the future cannot be forecasted even if one knows the past movements of equity. The EMH theory hypothesizes, in other words, that asset prices evolve in the pattern of a random walk. It is therefore impossible to predict asset prices indicating an inability by investors to outsmart the market. In the second instance, some markets were described as semi-strong form efficient. The idea here is that today's security prices completely account for any information in the public domain. Public information is not limited to historical security price information but also consists of news concerning the performance of the firm, anticipations about macroeconomic fundamentals. In the last instance, a strong form efficient market was hypothesized. The conception communicated here is that in a strong form efficient market, security prices completely account not only for historic and public news but also information which is privately held. The EMH's implications are broad. From the perspective of an investor, equity market participants should lack the ability make supernormal profits irrespective of the kind of news they are privy to.

As was stated earlier, investors will not be able to repeatedly outsmart the market assuming a world where equity markets were perfect. This is consistent with the economic principle that rational investors will only be willing to pay for an asset, the current value of its future cash flows. Generally, the current worth of future cash flows is determined by a discount factor, which is the amount of uncertainty accompanying the investment, taking into account all significant information available. The effective stock market can aid in the efficient allocation of economic resources from an economic point of view. For example, if unproductive companies ' shares are not priced correctly, unproductive sectors will be allocated new savings. The rate of fluctuations in security prices, or volatility, represents relatively underlying economic dynamics in the EMH region. Levich (2001) argues along these lines that the intervention of policymakers could unsettle the market resulting in its inefficiency. The three dimensions of the EMH are most often utilized as guiding principles in the literature and not as rigid facts (Fama, 1991). However, in a number of empirical works, the EMH has been analyzed in its weak and semi-strong forms partially due to the difficulty in measuring the strong form and also because of the high cost of collecting information which is held privately. (Timmermann and Granger, 2004).

The present study examines the long and short run dynamic effect of macroeconomic fundamental in Ghana on the country's equity market performance. The utilization of the EMH in this study should help our comprehension of the phenomenon if no relationship is found between the selected economic factors and equity prices/returns. This is due to the EMH's postulations that equity prices already account for all available information. A finding of significant relationships will however demonstrate the inefficient nature of the Ghanaian market.

2.2.2 Arbitrage Price Theory (APT)

In general, the theory of asset pricing reveals how assets are valued taking their risk exposure into consideration. The arbitrage price theory (APT) introduced by Ross (1976) has been an essential extension of the asset price theory. APT is a general form of the capital asset pricing model (CAPM) of Sharpe (1964). While the CAPM suggests that one common factor drives asset prices or expected returns, the APT posits that a number of macroeconomic variables drive them. APT can be expressed in mathematical terms as:

$$R_{it} = r_i^f + \beta_i X_t + \varepsilon_t \qquad (2.2)$$

R_{it} is "stock return of stock i at time t, r_i^f is the risk-free rate of interest or expected return at time t. X_t is a vector of fixed economic factors, while β_i calculates stock exposure to every economic factor included in X_t. The error term ε_t represents unsystematic risk or risk premium of securities that cannot be diversified.

Ross (1976) shows that, in the first step, there is an approximate relationship between the expected returns and the estimated β_{ik}, given that the condition of no arbitrage is fulfilled, i.e., the expected return $E(R_i)$ rises as investors tolerate more uncertainty, assuming that all resources on the market are competitively priced. This nexus can be represented as a cross-sectional equation in which the β_{ik} estimate is used as explanatory variables:

$$E(\bar{R}_i) = \lambda_0 + \lambda_1 \hat{\beta}_{1k} + \lambda_2 \hat{\beta}_{2k} + \cdots + \lambda_n \hat{\beta}_{nk} + \mu_i \qquad (2.3)$$

Where R_i is the mean excess return on asset i and $\hat{\beta}$ is the sensitivity of the return of the security n to the risk factor k. The λ_n's are the reward for bearing risk related with fluctuations in the economic factors. Equation (2.3) simply states that an asset's expected return depends on a number of factors and how sensitive the stock is to these factors. Interestingly, APT does not specify the type or number of macroeconomic factors to be included in the study by researchers. For instance, Ross

et al. (1986) after carrying out investigations on how factors such as yield curve shifts, inflation, investor confidence and gross national product influence asset prices, opined that the APT cannot be restricted to these factors. A considerable number of previous studies have considered lots of distinct macroeconomic variables, contingent on the stock market they studied. Four domestic economic factors including money supply, interest rates, exchange rates and inflation rates will be included in this study to investigate their impact on the performance of the Ghana stock exchange (GSE). Analysts are also faced with the challenge of pinpointing factors that play an important role in understanding individual stock market fluctuations. Although some economic factors may be predetermined by analysts, their selection must be founded on reasonable theories (Chen et al., 1986)."

The arbitrage pricing theory is useful in this study to help explain significant relationships between the selected macroeconomic factors and equity market returns. With the APT postulating asset prices are influenced by multiple economic factors, the theory predicts significant relationships between the variables of study.

2.2.3 Modern Portfolio Theory

Harry M. Markowitz published in 1952 a path-breaking article (Markowitz, 1952), in which he argued that the traditional application of one-dimensional investment criteria such as the Net Present value (NPV) should be replaced by two dimensions: Expected returns and risk defined as the standard deviation of the return distribution. (Balling & Gnan, 2013) In 1990, Markowitz received the Nobel Prize in economics for having developed a strong analytical basis for that wise recommendation, which can be followed by individuals, firms, mutual funds and institutional investors. Markowitz (1952) spread the notion that investors should build their portfolios on the

basis of expected returns (desirable) and returns variance (undesirable), in order to maximize the former and minimize the latter, by diversifying assets with reduced covariance. Markowitz (1952) rejected the idea that investors should base their portfolios solely on the greatest expected return, because adopting this criterion may lead to two assets with similar returns being allocated to the investment portfolio with no analysis of their contribution to its risk. He also explained that a portfolio with the maximum expected return is not necessarily that with the least risk, and stresses that a naively diversified portfolio, which does not account for the relationship between assets (stocks) and considers only their amount, does not necessarily mitigate risk (Saito, Savoia, & Fama, 2013). To Markowitz (1952), although diversification allows reduction of portfolio risk, it does not eliminate the variance in a portfolio, that is, diversification does not lead to complete extinction of the risk present in an investment portfolio. One may state that Markowitz (1952) implicitly contributed to our understanding of the concepts of systematic (non-diversifiable) and nonsystematic (diversifiable) risk, which were later explicitly explored by Sharpe (1964). The Markowitz model (1952) was therefore important because it allowed propagation of the understanding that diversifying a portfolio by holding assets with a reduced level of correlation (covariance) is important for mitigating portfolio variance in relation to its expected return (risk). In his article, Markowitz (1952) explained that combining all assets and all risks allows the portfolios with the greatest level of return for a given amount of risk to be identified out of a set containing all possible portfolios. This was named the efficient frontier. In 1989, J.P. Morgan decided to develop a portfolio model, which was able to measure and explain the risks of the firm on a daily basis. In 1992, J.P. Morgan launched the Risk Metrics methodology to the marketplace for free (J.P. Morgan/Reuters, 1996). The staff of the firm made daily updates of spot prices, volatility estimates and correlation estimates accessible through the internet. They explained that

they did so because the firm was interested in promoting greater transparency of market risks; they wanted to establish a benchmark for market risk measurement and to use the Risk Metrics methodology to help clients to understand their portfolio risk. In 1993-1994, J.P. Morgan revised their technical document and popularized the concept Value-at-Risk (VaR) as portfolio risk measure to be applied by financial institutions in the capital adequacy calculations to be presented to financial regulators. VaR is a downside measure estimated by means of historical statistics on volatility and correlations among a sample of financial assets and focusing on the probability of suffering losses. For a given portfolio, probability and time horizon, VaR is defined as a threshold value, which can be used to instruct the portfolio manager to keep the probability of suffering losses below a certain level. (Balling & Gnan, 2013). VaR actually became the standard for the measurement of portfolio risk with official endorsement in the 1993 proposal from the Basel Committee as well as in the Capital Adequacy Directive (93/6/EEC) from the European Commission.

2.3 Empirical Review

Several studies have been conducted over the years on stock market performance. These studies differ in approach, methodology, context and factors employed to explain changes in market performance. Though studies on the subject abound in the advanced markets and other emerging markets in Asia and Latin America, studies on African markets and especially Ghana are considerably few. This section reviews some studies conducted in economies outside Africa, in Africa and in Ghana on the short and long run relationships between macroeconomic fundamentals and stock market performance.

2.3.1 Long Run Effects of Macroeconomic Factors on Stock Market Performance

The long relationship between the variables of interest has been studied across different economies. In Pakistan, Hasan and Javed "(2009) examined the long run effect of monetary factors such as money growth, exchange rates, inflation and short term interest rates on share values. Analyzing data of monthly periodicity from June 1998 to June 2008 using VAR models, their study established long run relationships between share values and monetary factors in Pakistan. Their results give indication that share price movement is negatively related to changes in interest rates and exchange rates but positively related to growth in money supply. Inflation was found to have no significant impact on share prices. Further, their results pointed to money supply, exchange rates and interest rates as the most important among the factors considered as they accounted for the variation in share values. They thus suggested that, in formulating monetary policies, policymakers in Pakistan should pay particular attention to exchange rates, money supply and interest rates as these factors have the potential to significantly influence the stability of the capital market in the long run. Examining how oil price movements affect market performance in Greece, Hondroyiannis and Papapetrou (2001) observes shocks in oil prices to negatively but significantly influence the movements of equity market returns in the long run. Empirical studies on African markets have demonstrated that certain macroeconomic factors have the capacity to alter the performance of African stock markets either in the positive or negative sense. In Africa, Ndlovu, Faisa, Resatoglu and Türsoy (2018) used quarterly data spanning 1981Q1 to 2016 Q4 to investigate how equity prices in South Africa are related economic factors including money supply, exchange rate, interest rate and inflation rate. Using a number of VAR models including the VECM, FEVD, IRF and cointegration tests in conducting data analysis, their study finds inflation, interest rates and money supply to be positively related to equity market returns on South Africa's JSE in the long run. Exchange rates on the other hand are observed to have a negative

long run nexus with equity returns. They also discovered that a greater percentage of the variations in equity returns is accounted for by past levels of variations in equity returns. Examining the influence of macroeconomic factors on market returns, Barakat, Elgazzar and Hanafy (2015) use VAR models to find that money supply, interest rates and exchange rates significantly and positively influence equity prices in Tunisia in the long run. Babatunde and Adenikinju (2013) examine how changes in oil prices affect Nigerian equity market prices using multivariate vector auto-regressions consisting of IRF's and FEVD's. Their results revealed that equity market prices show positive but insignificant reactions to changes in oil prices in the short run but, depending on the nature of the shock, suffer negative effects in the long run. The authors conclude that changes in oil prices have a higher explanatory power for equity returns than interest rates indicating that movement in oil prices is major determinant of equity return changes on the Nigerian equity market. Asaolu and Ilo (2012) looked at how oil price fluctuations affected equity market returns from 1984 to 2007 under the framework of co-integration and vector error correction. It was discovered that oil price increases contributed to a drop in stock returns in Nigeria in the long run. The authors pointed out that the government should ensure that oil revenues impact positively on the stock market, given Nigeria's status as a major oil producer. Utilizing vector autoregressive models, Akonnor (2016) assesses the relationship between equity price movements and macroeconomic fundamentals in Ghana. Examining macroeconomic factors including were inflation rate, exchange rate, treasury bill rate, crude oil prices, cocoa price, gold prices, gross domestic product and balance of payment account (BOP) over the period 2006 to 2014, the study finds exchange rate, GDP and inflation rate to exhibit significant influences on equity prices on the GSE in the long run, with exchange rate having a negative influence whilst the rest exert a positive influence. The author identifies exchange rate as the most influential of the three and

recommends that government formulates policies towards currency appreciation. Kuwornu (2012) employs cointegration techniques to investigate the association between stock price changes on the Ghana stock exchange and macroeconomic variables. The study which considered factors such as interest rates, inflation, exchange rates and crude oil price over the period January 1992 to December 2008" find share price movements to share positive significant relations with inflation, interest rate and exchange rate in the long run. Crude oil prices are however found to have adverse long-run effects on stock prices in Ghana. The study argues that investors on the Ghanaian market are compensated for inflationary increases in the long run.

2.3.2 Short Run Effects of Macroeconomic Factors on Stock Market Performance

Camilleri, Scicluna and Bai (2019) explored the ties between stock price fluctuations and fundamental macroeconomic indicators: unemployment, production, interest rates, and money supply. Their research used vector-autoregressive "(VAR) models to evaluate monthly data covering the period 1999–2017 for Belgium, France, Germany, Portugal and the Netherlands. They find that changes in interest rate and money supply share positive relations with stock price movements in the short run for France, Germany, and Portugal. Rahman and Mustafa (2008) utilized data of monthly periodicity spanning January 1975 to April 2006 to examine how changes in money supply and oil prices influence U.S's S&P 500 index in both the short and long run. Their findings provided support for the co-integration of all three variables. The vector error correction model (VECM) showed no long-term causal relationships although there were significant positive short-term feedback relationships observed between both independent variables and the S&P 500 index. Hondroyiannis and Papapetrou (2001) investigated how equity returns in Greece are related to a number of selected macroeconomic fundamentals and global factors including exchange rates, industrial production, interest rates, the S&P 500 returns and

world oil prices. Analyzing data by the use of VAR models, they find that whilst equity market returns in Greece have no significant influence on the macroeconomy, shifts in industrial production and exchange rates only weakly explain fluctuations in equity market returns in the short run. Unidirectional short run causal relationships were discovered by their study to exist between inflation, budget deficiencies, money supply, interest rates, trade deficits and equity returns with the aforementioned all Granger causing equity returns. In line with economic theory, interest rates, trade deficits and budget deficiencies were found to have negative relationships with equity returns. Equity returns were however found to have positive relations with both money supply and inflation. Barakat, Elgazzar and Hanafy (2015) examined the nature of influence macroeconomic factors such as inflation, interest rates, exchange rates and money supply in Egypt and Tunisia exert on equity returns over the period spanning 1998 to 2014. Utilizing VAR models, the authors find money supply, inflation and exchange rates to share positive relations with Egyptian market returns in the short run whilst an adverse relationship is observed in the long run with interest rate. Also, Prempeh (2016) used the Granger causality test to examine how macroeconomic factors affect changes in stock prices on the Ghana stock exchange. Assessing the relationship over the period, 1990 to 2014," the study finds a significant short-run unidirectional causality from real gross domestic growth rate to equity prices. Other macroeconomic factors such as interest rate and inflation were found to have no significant influence on prices. The author thus argues that GDP growth rate be considered in predicting price movements in Ghana.

2.4 Conceptual Framework

The study examines the short and long run dynamic relationship between macroeconomic fundamentals and stock market performance. Inflation, exchange rates, interest rates and money

supply are the macroeconomic factors selected based on their theoretical and empirical relevance to explain the changes in stock market performance in the short run and the long run. Control variables including market liquidity and market size have also been employed to aid in adequately explaining stock market performance. The study adopts the conceptual framework used by Hasan and Javed, 2009 and this is presented below.

Figure 1: Conceptual Framework

Explanatory Variables
Money Supply

Exchange Rates

Interest Rates

Inflation

Control Variables

Market Liquidity

Market Size

Explained Variable

Stock Market Performance (Measured by Stock Market Returns)
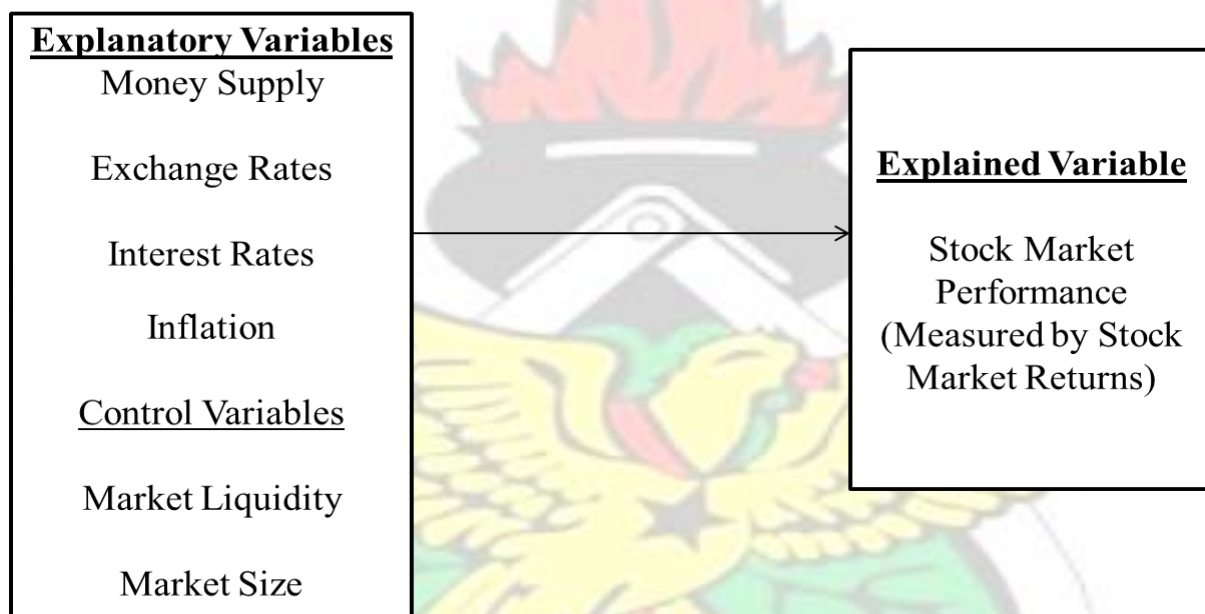
3.0 Introduction

This chapter begins with an introduction to the research design employed for the study and continues with a presentation of the sample data used for the study. Thereafter, there is a description of data collection methods. This is followed by a description of the econometric methodology employed for the study. The chapter concludes with a description and definition of variables used in the study.

3.1 Research Design

This study utilizes an explanatory research design as it allows for easier identification and assessment of causal relationships among the selected variables understudy. The study examines how stock market performance is influenced by macroeconomic fundamentals in the Ghanaian context. Previous studies that have investigated relationships of this nature are mostly quantitative in nature. Considering the formulated problem and the nature of data used, this study follows prior studies in adopting a quantitative research approach to achieve the objectives of the study.

3.2 Data and Variables Definition

This section provides a description of the data used and the mode of measuring the variables used in the study.

3.2.1 Data

Secondary data was used in this study. The stock market data used in this study is the Ghana stock exchange monthly composite index. The monthly stock market index is obtained from the bank of Ghana (BOG) data repository. Based on their empirical relevance to stock price movements, the macroeconomic factors selected to explain the Ghanaian market performance include inflation, interest rates, money supply and exchange rates. The liquidity and size of the Ghanaian market have also been selected as control variables for the study. Data on the macroeconomic factors is sourced from the international financial statistics (IFS) of the international monetary fund (IMF) whilst the liquidity and size are obtained from website of the Ghana Stock Exchange. Stock market performance measured by monthly stock market returns are obtained through the logarithmic transformation of monthly indices expressed mathematically as SMR = [ln(GSE-CI$_t$) – ln(GSE-CI$_{t-1}$)] *100. Where SMR is stock market return and GSE-CI is stock market index. Data on all variables are collected for the period spanning January 2004 to December 2018 making a total of 180 observations.

3.2.2 Variables Definition

This study is conducted to examine the short and long run dynamic effects of macroeconomic fundamentals on stock market performance in Ghana. The dependent variable for the study is stock market performance measured by stock market returns. The value of a stock is equal to the discounted amount of expected future dividends, according to the Gordon and Shapiro (1956) model. Miller and Modigliani (1961), however, suggest that a company's intrinsic profit basis is derived from earnings as dividends are merely earnings-funded payouts. This follows, therefore, that the systemic factors influencing stock prices are those affecting expected earnings and the rate

of discount. As such, the independent or explanatory variables selected for the study are conventional macroeconomic factors including exchange rates, inflation, interest rates and money supply. The study also employs control variables such as market liquidity and market size to help explain changes in market performance which may not be accounted for by the main explanatory variables. The next section thus offers a description of both the main explanatory variables as well as control variables.

3.2.2.1 Interest Rates (IR)

In asset pricing, volatility of interest rates is quite important. Its most notable influence is on the rate of discount. An inverse relationship is postulated by financial theory to exist between equity prices and interest rates. A rise in interest rates increases the discount rate and this negatively influences equity price movements. Nevertheless, through its impact on equity demand and corporate performance, the interest rate also influences stock prices. From the asset allocation perspective, a high interest rate (signifying the cost of opportunity) can induce investors to replace equity in their portfolio with other financial assets, thus increasing stock demand. Increasing interest rates often place higher financing costs on companies, leading to lower productivity and declining equity prices. The study of Chen et al. (1986) finds evidence to back the hypothesized inverse nexus. This study uses the Government of Ghana's 90 day Treasury bill rate as proxy for interest rate in accordance with Bernanke (2003).

3.2.2.2 Inflation (CPI)

Equity prices and inflation are commonly found to share a negative relationship (Fama, 1981; Chen et al., 1986). According to economic theory, increases in expected inflation leads to a rise in

interest rates which negatively influence equity prices. Further inflation increases a company's production costs in a competitive economy, decreasing the future cash flows and equity prices (DeFina, 1991). Therefore, an inverse nexus is expected between equity prices and inflation. Following the work of Hatemi-J (2009), the consumer price index (CPI) is adopted in this study as a measure of inflation.

3.2.2.3 Money Supply (M2)

It has been discovered by a number of studies that money supply exerts a significant influence on equity prices. The nature of influence however still remains an empirical issue. Increases in money supply can trigger increases in equity prices according to Dhakal et al., (1993). They posit that all things being equal, increases in money supply generate an excess supply of cash balances and additional demand for stocks, triggering a rise in stock prices. Alternatively, due to the positive relationship between money supply and inflation, increases in money supply may increase inflation which in turn increases interest rates resulting in declining equity prices. The broad measure of money supply (M2) which consists of narrow money supply components, time deposits and savings deposits is used as proxy for changes in the supply of money in the Ghanaian economy. Its use is based on its empirical relevance to stock returns as found by Bernanke and Kuttner (2005).

3.2.2.4 Exchange Rates (EX)

Using the trade balance approach, the impact of exchange rates on stock market indices can be explained. This explains that a local currency appreciation could lead to a relative increase in the world market price of domestic products. According to Dornbusch and Fischer's (1980) goods

balance approach, this is expected to decrease domestic export demand, thus reducing cash inflows to the country. In comparison, local currency depreciation makes local goods cheaper for foreigners, leading to higher domestic exports and higher capital inflows. These larger capital inflows may translate to increases in production and profitability for firms, increasing firm value (stock prices). This study measures exchange rate in its nominal terms as units of the Ghanaian cedi per United States dollars consistent with Abbas et al. (2018).

3.2.2.5 Market Liquidity (TV)

Market liquidity is employed as a control variable to help account for the changes in market performance. The selection of the variable is based on evidence provided by empirical literature on its influence on stock returns. Indeed a lack of liquidity has been found by "(Pathirawasam, 2011) to have adverse effects on the value of stocks. This is because rational investors will require a higher premium as compensation for holding less liquid stocks in the market. Therefore liquid stocks are expected to have risk adjusted returns lower than those of less liquid stocks. Literature is however yet to suggest a generally accepted measure for liquidity because of the ambiguity in its definition. As noted by Kyle (1985), liquidity is a slippery and elusive concept, in part because it encompasses a number of transactional properties of markets which include tightness, depth, and resiliency. Some studies have employed bid-ask spread and trading cost as liquidity measures (Amihud & Mendelson, 1986; Brennan & Subrahmanyam, 1996) but in practice, data on bid-ask spreads and trading costs are difficult to obtain. As a result of this challenge in data limitation, trading volume which has been used by Chordia, Roll & Subrahmanyam (2001), Nguyen, et.al (2007), Lam & Tam (2011) and Batten and Vo (2014)" to proxy liquidity in their respective studies is also employed in this present study as the measure of liquidity.

3.2.2.6 Market Size (MC)

The study also employed market capitalization as a second control variable to observe whether the size of the Ghanaian market plays any role in influencing its performance. The adoption of the variable follows the empirical works of Banz (1981), "Fama and French (1993), and Berk (1995). The size of a market according to Fama and French (1993) gives an indication of the market's risk level. Berk (1995) provides evidence to show that market size and expected returns share an inverse relationship. The finding is rationalized by the fact that smaller firms are considered more risky than larger firms. This perception of risk increases the required rate of return on smaller firms pushing down their market prices. The converse is true for larger firms, who due to their lower risk perception have lower required rates of return, driving up prices. Along the same Perez-Quiros and Timmermann (2000) and Chan and Chen" (1991) also posit that the size of a market influences its return as it gives an indication of the market's risk level. Market size is therefore largely expected to adversely affect market returns.

Table 3.1: Definitions of variables and Mode of Measurement

Explained Variable	Definition	Mode of Measurement
Stock Market Returns (SMR)	Differences in the natural logarithm of monthly GSE-CI	$[\ln(\text{GSE-CI}_t) - \ln(\text{GSE-CI}_{t-1})] *100$
Explanatory Variables	**Definition**	**Mode of Measurement**
Interest Rate (IR)	Natural logarithm of the 90 day government Treasury bill yield	$\ln(\text{IR})$
Inflation (CPI)	Natural logarithm of the monthly Consumer Price Index	$\ln(\text{CPI})$
Money Supply (M2)	Natural logarithm of the month-end broad supply of money	$\ln(\text{M2})$
Exchange Rates (EX)	Natural logarithm of month-end nominal exchange rate (Units of Ghana Cedi per US dollar)	$\ln(\text{ER})$

| Market Liquidity (TV) | Natural logarithm of month-end Trading Volume | ln(TV) |
| Market Size (MC) | Natural logarithm of month-end Market Capitalization | ln(MC) |

3.3 Empirical Methodology and Model Specifications

This section discusses the empirical methodology and model specification adopted by this current study.

3.3.1 Autoregressive Distributed Lags (ARDL)

In assessing the nature of long and short run association existent between macroeconomic factors and stock market performance in this study, the Autoregressive Distributed Lags (ARDL) econometric technique is adopted. This technique was proposed by "Pesaran & Shin (1998) and was later adjusted by Pesaran et al. (2001). The technique has been massively employed in research due to its superior qualities relative to traditional methods used in examining cointegrating and long/short run associations. First, the ARDL unlike the Granger/Engel causality test proposed by Engle & Granger (1987), the Johansen's cointegration tests proposed by Johansen (1991) and the vector autoregressive (VAR) model, can be used to effectively test for level relationships between variables which are either integrated of order zero (I(0)) or order one (I(1)) as well as a mix of variables integrated of both I(0) and I(1) (Adom et al. 2012; Duasa 2007; Faruk and Aydın (2013)). Variables of second order integration I(2) can however not be included in ARDL estimations. The rare ability of the technique to consider a combination of variables integrated of both orders and gives it an advantage over other methods as most financial data have either of these orders of integration. In this respect, the ARDL's relative superiority over VAR models is clearly

appreciated as VAR models strictly require stationary series for estimations. Thus, a series would have to first be transformed at its first difference I(1) if it is not stationary at level before VAR estimations can take place. (Faruk and Aydın (2013). Brooks (2014), however, points out that utilizing the first differences of data series has a tendency of distorting long run relationships between variables resulting in misleading conclusions. The utilization of the ARDL technique however does not require such data transformations and therefore allows for accurate estimations of both short and long relations. Also, in the ARDL framework, short run effects of selected variables are integrated with the long run equilibrium utilizing an error correction term without having to drop long run information. Consequently, the method allows for assessing simultaneously both the long and short run association between selected variables. Further, Pesaran et al. 2001 find the ARDL to be more flexible relative to conventional cointegration tests as the ARDL allows for the determination of varying lags for each of the variables in the model. Finally, whilst most cointegration methods exhibit sensitivity to the size of the data set, the ARDL framework generates results that are consistent and robust for small sized data sets (Pesaran & Shin 1998, Pesaran et al. 2001, Adom et al. 2012)." The relatively small sample size used in this study together with all the enumerated advantages of the ARDL over other statistical techniques justifies the choice of the ARDL as the preferred econometric technique for this study. The ARDL is therefore adopted in this study to examine the short and long run associations between Ghana's economic fundamentals and trends in the country's stock market performance.

3.3.1.1 Model Specification

In examining how different variables are related to each other, it is standard practice to demonstrate through mathematical equations how the dependent variable is expected to be explained by the independent variables as seen in equation 3.1.

$$Y = f(X_i) \qquad\qquad (3.1)$$

Where $X_i = X_1, X_2, X_3 \ldots$

Y is the explained variable whilst X represents a vector of explanatory variables with f being a function.

The modified ARDL process proposed by Pesaran et al. "(2001) is a process that attempts to identify the relationships in f(X). The ARDL model in this section will be explained in its simplest form, i.e. a single variable ARDL (p,q) model. The model is then applied to the study variables in the section following. In accordance with the studies of Pesaran et al. (2001) and Pesaran & Shin (1998), the ARDL model (p,q) specified for this study is expressed by equation 3.2 where Y_t represents the explained variable whilst X_t represents the explanatory variables with p and q being the respective lags.

$$\Delta y_t = \beta_o + C_O t + \sum_{i=1}^{p} \partial_i \Delta y_{t-i} + \sum_{j=0}^{q} \omega_j \Delta x_{t-j} + \gamma_1 y_{t-1} + \gamma_2 x_{t-1} + \epsilon_t \qquad (3.2)$$

β_o represents the drift coefficient whilst C_O represents the trend coefficient. The white noise error term is depicted by ϵ_t. For all values of j, the coefficients ∂_i and ω_j correspond the relationship in the short run whilst for j = 1; 2, γ_j corresponds to the relationship in the long run. Since the model attempts to identify how variables are related in the long run, it is imperative to explain in ARDL

terms what a long run relationship means. In econometric language, variables that share a long run relationship will normally converge at a point after some considerable period of time without any dramatic changes in values (Brooks 2014). In the long run equilibrium therefore, there is stability in the system meaning that the conditions of the system remain the same over a period of time. That is $y_t = y_{t-1} = y$; $x_t = x_{t-1} = x$.

The implication here is that, in long run equilibrium, variables in their first difference as indicated in equation 3.2 will equal zero. Explaining further, since the assumption is that the model converges to equilibrium, variables at first difference equal zero. That is, $\Delta y_{t-i} = \Delta x_{t-j} = 0 \; \forall \; i,j$ in the long run (Brooks, 2014). This hypothesis is demonstrated in macroeconomics considering the price-quantity nexus in a demand-supply diagram as both supply and quantity remain constant at equilibrium. Consequently, for the single variable case, the long run equation is expressed as follows:

$$\gamma_1 y_{t-1} + \gamma_2 x_{t-1} + \epsilon_t + \beta_o + C_o t = 0 \qquad (3.3)$$

The long run coefficient for x is therefore expressed as $-\frac{\gamma_2}{\gamma_1}$.

Having expressed the ARDL model in equation 3.2, the analytical procedure using the ARDL technique is subdivided into three main stages." In the first stage the ARDL model expressed in equation 3.2 is estimated which then allows an F-bounds test for long run nexuses between variables to be conducted.

3.3.1.2 F-Bounds Test and Error Correction Modelling

Examining the results of an estimated ARDL model as expressed in equation 3.2, it is possible to ascertain if the variables share long run relationships. This can be accomplished by performing an

F-bounds test. In this test, the estimated "coefficients of the single period lagged variables $\gamma 1$ and $\gamma 2$ in the ARDL model are examined to determine if they jointly equal zero. The following are therefore hypothesized for testing:

$H_0 : \gamma_1 = \gamma_2 = 0$: There is no long run nexus.

$H_1 : \gamma_1 \neq 0 \cup \gamma_2 \neq 0$: There is a long run nexus.

In the ARDL model, the F-test has a non-standard distribution which relies on:

1. The combination of I(0) and I(1) explanatory variables.

2. The number of explanatory variables

3. Whether the model contains an intercept and/or trend.

This hypothesis tests differ from the conventional hypothesis tests in that it has both lower and upper bounds of critical values with three distinct cases. In order for the null hypothesis not to be rejected or rejected, the critical values presented by Pesaran et al. (2001) must be considered. A long run nexus between variables will be confirmed irrespective of their order of integration if the upper bound is less than the estimated F-statistic indicating a rejection of the null hypothesis (Duasa 2007). In a scenario where the lower bound is higher than the F-statistic, a rejection of the null hypothesis is not possible whilst also the existence of cointegration is insignificant. The test is however inconclusive in case the F-statistic is found to lie between the lower and upper bounds in which event additional data is required for a reliable conclusion to be reached (Pesaran et al. 2001):

$$\text{Failure to Reject } H_0 < \text{Inconclusive} < \text{Reject } H_0 \qquad (3.4)$$

In accordance with the studies of Kremers et al. (1992) and Banerjee et al. (1998), a possible solution in the event of inconclusive results is the examination of the error correction term.

Bahmani-Oskooee & Nasir (2004) and Pahlavani et al. (2005) under such circumstances for instance employed the error correction term in identifying cointegrating and long run nexuses between variables. An alternative test which can be undertaken to examine the coitegration among variables is the T-test which is similar in approach to the F-test. In the event of inconclusiveness using the F-test, the T-test can be performed as an alternative. In defining an error correction term, which is the second stage if the ARDL process, certain suppositions are to be made. Supposing that the F-bound test generates adequate estimates, long run equilibrium relationships could be identified without misleading regressions since the linear mix of non-stationary variables appear stationary in an ordinary least square framework:

$$y_{t=} \beta_o + \beta_1 x_t + \epsilon_t \tag{3.5}$$

In capturing how the model converges to equilibrium, the ECT is explained by $ECM_{t-1} = y_{t-1} - \hat{\beta}_o - \hat{\beta}_1 x_{t-1}$ with the $\hat{\beta}$s representing estimators in equation 3.5. It should be noted that the ECM_{t-1} represents errors from equation 3.5. Additionally, as the model approaches equilibrium in the long run, the gap between explanatory variables and explained variables cannot grow as this would cause a divergence. The gap is therefore expected to gradually decrease. Also, given that the regression in equation 3.5 has made the variables x_t; y_t; β_j available, ECM_{t-1} forms a new data series. The third and last stage of the process involves the estimation of the short run dynamic relationships between the variables using equation 3.2. Here, the lagged variables y_{t-1} and x_{t-1} are replaced with the error correction term ECM_{t-1}. The modified equation is expressed as follows:

$$\Delta y_t = \beta_o + C_o t + \sum_{i=1}^{p} \partial_i \Delta y_{t-i} + \sum_{j=0}^{q} \omega_j \Delta x_{t-j} + \lambda ECM_{t-1} + \epsilon_t \tag{3.6}$$

The model will converge to equilibrium only if λ which is the coefficient of the error correction term is negative and statistically significant. Additionally, the finding of a significant and negative coefficient for the error correction term lends credence to any identified cointegration and long run

relationships between explanatory and explained variables. The error correction term's coefficient also carries information on the speed of adjustment towards." This information reveals how quickly a variable return to equilibrium after it receives a shock from another variable.

3.3.1.3 Application of the ARDL Model

In this present section, the ARDL model is applied to the data employed for the study. The general equation formulated is then presented and explained. "Optimal lag selection procedures as well as various diagnostic tests adopted are also described.

The study aims to examine the short and long run dynamic relationships between some selected macroeconomic variables and stock market performance in Ghana. Stock market returns (SMR) representing market performance has been adopted as the dependent variable in this study whilst domestic macroeconomic factors including interest rate (IR), inflation rate (CPI), money supply (M2) and exchange rate (EX) are used as the main explanatory variables. Other variables acting as control variables adopted to help adequately explain market performance include market liquidity (TV) and market size (MC). All variables are transformed into their logarithmic form in order to ease interpretation and mitigate the possibility of having heteroscedasticity in the model. In line with the above description and equation 3.2, the applied ARDL model is expressed as follows:

$$\Delta \ln (SMR)_t = \beta_o + \sum_{i=1}^{p0} \partial_i \Delta ln(SMR)_{t-i} + \sum_{i=0}^{p1} \omega_i \Delta \ln (IR)_{t-i} + \sum_{i=0}^{p2} \alpha_i \Delta \ln (CPI)_{t-i}$$

$$+ \sum_{i=1}^{p3} \gamma_i \Delta (M2)_{t-i} + \sum_{i=0}^{p4} \delta_i \Delta \ln (EX)_{t-i} + \sum_{i=0}^{p5} \theta_i \Delta \ln (TV)_{t-i} + \sum_{i=1}^{p6} \vartheta_i \Delta (MC)_{t-i} +$$

$$\eta_0\ln(SMR)_{t-1} + \eta_1\ln(IR)_{t-1} + \eta_2\ln(CPI)_{t-1} + \eta_3\ln(M2)_{t-1} + \eta_4\ln(EX)_{t-1}$$

$$+ \eta_5\ln(TV)_{t-1} + \eta_6\ln(MC)_{t-1} + \epsilon_t \qquad (3.4)$$

From equation 3.4, P_j for all j's represent the chosen lag lengths, β_o proxies the intercept whilst ϵ_t is the white noise. All other coefficients explain the long and short run nexuses between the regressand and regressors. The η_j, for j = 0 to 6 explain the long run associations whilst the coefficients of the first differenced variables (i.e. ∂_i, ω_i, α_i, γ_i, δ_i, θ_i, ϑ_i for all i) describe the short run relationships.

The corresponding error correction equation is expressed in equation 3.5. In examining this equation, the relevance of each variable will be appreciated from the perspective of statistical significance rather than from size of the estimated coefficients." The implication here is that if a variable is found to be significant, then its relevance in explaining the dependent variable is validated.

$$\Delta\ln(SMR)_t = \beta_o + \sum_{i=1}^{p0} \partial_i\Delta ln(SMR)_{t-i} + \sum_{i=0}^{p1} \omega_i\Delta\ln(IR)_{t-i} + \sum_{i=0}^{p2} \alpha_i\Delta\ln(CPI)_{t-i}$$

$$+ \sum_{i=1}^{p3} \gamma_i\Delta(M2)_{t-i} + \sum_{i=0}^{p4} \delta_i\Delta\ln(EX)_{t-i} + \sum_{i=0}^{p5} \theta_i\Delta\ln(TV)_{t-i} + \sum_{i=1}^{p6} \vartheta_i\Delta(MC)_{t-i}$$

$$+ \lambda ECM_{t-1} + \epsilon_t \qquad (3.5)$$

3.3.1.4 Lag Selection

In order to establish long run relationships between variables using the ARDL model, it is imperative to determine the optimal lag length to be used. This is due to the finding that a

misspecification in the lag length for the ARDL model often produces autocorrelated errors (Lütkepohl, 2005). A number of methods exist in literature but the most prominent in among these methods are the Akaike information criterion (AIC), and the Schwarz information criterion (SIC). Pesaran & Shin (1998) however find the Schwarz information criterion to perform slightly better than the Akaike information criterion in generating reliable estimates in small samples using the ARDL framework. The AIC also possesses the tendency to overestimate the lag length which is unfavorable in small sample sizes as increasing lag lengths reduces the quantity of observations. The SIC will thus be utilized in this study to determine the appropriate lag length for the ARDL model and for the augmented Dickey-Fuller (ADF) test. However, as suggested by Pesaran et al. (2001), the number of lags selected should be adjusted to address potential biases and to eliminate heteroscedasticity, autocorrelation and non-normality.

3.3.1.5 Diagnostic Testing

In order to draw cogent conclusions from the results of the ARDL process, the model must be tested to determine its robustness. In accordance with prior studies including Hasan & Nasir (2008) and Tian & Ma (2010), this study will test for stability, autocorrelation, heteroscedasticity and normality in the error terms of the ARDL model. The absence of autocorrelation, heteroscedasticity, non-normality and model instability gives authorization to draw reliable inferences from the results.

3.3.1.5a Test for Stability

Due to the sensitivity of the ARDL model to structural breaks, it is imperative to test the stability of the model especially because the study is using financial data which is easily influenced by global events. "The cumulative sum recursive errors (CUSUM) and the cumulative sum of squared

recursive errors (CUSUMSQ) tests introduced by Brown et al. (1975) will be used in this study to examine the stability of the short and long run coefficients estimated from the ARDL model. In case the coefficients are found to be unstable, previous studies suggest that increasing the sample size or introducing dummy variables may eliminate the problem (Fuinhas and Marques 2012; Naiya & Manap 2013; Juselius 2006). The bases of the tests are the cumulative sum of the recursive errors (CUSUM) and the cumulative sum of squared recursive errors (CUSUMSQ) tests which are recursively updated are graphical in nature and are plotted against the break points for the 5% significance line." In summary, the two tests are conducted to determine whether or not the residuals significantly stray from the mean value by imposing parallel critical lines at a 5% level of significance.

3.4 Conclusion

This chapter has described the data used and discussed the research method applied in the study. The autoregressive distributed lag (ADRL) has been selected as the preferred econometric technique for this study.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

The chapter presents results on how macroeconomic fundamentals influence the performance of stock markets in the Ghanaian context. First, the statistical properties of the data employed for the study is examined followed by an assessment of the degree of association among the study variables. Unit root tests are conducted thereafter to ascertain the stationarity or otherwise of the variables. The autoregressive distributed lag (ARDL) is then employed to investigate the nature of long and short run relationships between selected macroeconomic variables and the Ghanaian stock market performance.

4.1 Descriptive Statistics

In examining the basic features of the study variables, summary statistics are computed for all the selected variables. Table 4.1 presents the descriptive statistics of the variables used in the analyses.

Table 4.1 Descriptive Statistics

Variable	Mean	Max	Min	Std. Dev.	Skewness	Kurtosis	J-Bera	Obs.
SMR	0.87	17.51	-32.35	5.54	0.29	3.98	5.08*	147
IR	17.71	27.80	9.13	6.25	-0.19	1.36	17.40*	147
CPI	13.42	20.70	8.39	3.61	0.03	1.72	10.13*	147
M2	3855.74	10890.8	969.03	2765.34	0.14	1.78	9.65*	147
EX	2.14	4.48	0.91	1.20	0.30	1.72	12.11*	147
TV	844885.6	22170977	4000	2368279	0.14	3.83	4.66*	147
MC	50432.62	139616.2	11.47	29211.69	-4.32	36.66	7396.89*	147

Notes: * means statistical significance at the either 5 or 1 percent level. Skewness, Kurtosis and Jarque-Bera statistic are computed on the log of the variables. Obs. is Observations.

The descriptive statistics computed include the mean, standard deviation, skewness and kurtosis. The summary statistics for each of the study variables observed over the twelve year period from September, 2005 to December, 2017 are presented in Table 4.1. These statistics provide a historical background for the behaviour of the data. Over the period of the study, stock market return which is the dependent variable ranged from a minimum value of -32.35% to a maximum value of 17.51% with a mean of 0.87%. It recorded a standard deviation of 5.54, indicating that the observations disperse a little from around the mean. Amongst the main explanatory variables, money supply recorded a mean value of some GHC 3855.74 million over the period whilst interest rate and inflation averaged 17.71% and 13.42% respectively. The exchange rate which this study measures as local currency per United States dollar recorded a mean rate of GHC 2.14 per US$1 between a minimum of GHC0.91 per US$1 and a maximum of GHC4.48 per US$1. Money supply experienced the highest fluctuation over the period whilst the trend of interest rates, inflation and exchange rates remained relatively less volatile. Exchange rate is observed to exhibit a somewhat low standard deviation of 1.20 suggesting that the observations cluster a bit closely around the mean. Considering the control variables included in the study, trade volume representing liquidity of Ghana's stock market averaged 844,885.6 trades between a minimum of 4000 trades and a maximum of 22,170,977 trades. Market size measured by market capitalization is seen to average some GHC 50432.62 million. The results also show that the Jarque-Bera statistic is statistically significant for all the study variables. Also, given that the kurtoses of the variables are all significantly different from three, the distributions of these series exhibit non-normality (Stock and Watson, 2006). The negative values for skewness recorded for interest rates and market size suggest that these variables have long left tails whilst the positive values suggest variables with long right tails (Stock and Watson, 2006).

4.2 Correlation Analyses

In order to examine the relationship between the dependent variables and the set of independent variables, correlation analyses have been performed. The correlation analyses of all the variables of interest are presented in the Table 4.2.

Table 4.2 Correlation Matrix

	LNSMR	LNIR	LNCPI	LNM2	LNEX	LNTV	LNMC
LNSMR	1						
LNIR	-0.01	1					
LNCPI	-0.14*	0.66***	1				
LNM2	-0.01	-0.11951	0.37***	1			
LNEX	0.03	0.54***	0.311***	-0.57***	1		
LNTV	0.24***	0.02	-0.20**	-0.26***	0.16**	1	
LNMC	-0.17**	0.05	-0.03	-0.35***	0.27***	0.10	1

Notes: Significance at: *10, **5 and ***1 percent levels.
Source: **Author's Estimation (2020)**

Although comments on causation cannot be made at this point, the results reported in Table 4.2 reveal information on the strength of the relationships linking the variables of interest. The results reveal negative relationships between Ghana's stock market returns and all the considered macroeconomic variables with the exception of exchange rate albeit only statistically significant in the case of inflation. In particular, the results show market returns sharing a fairly negative relationship with consumer price index. Market liquidity proxied by trade volume and market size represented by market capitalization are observed to share significant relationships with stock market returns. Specifically, Market liquidity shares a fairly positive relationship with market returns whilst market size is seen to share a fairly negative relationship with market returns.

Dohoo, Ducrot, Fourichon, Donald and Hurnik (1997) argue that the problem of multicollinearity exist when the correlation between two explanatory variables is equal to or greater than ninety percent (90%). The correlation analyses presented in Table 4.3 shows that the highest correlation between the explanatory variables is 0.66 between interest rates and inflation. This is relatively lower and is reasonably ignored. The results therefore clearly indicate the absence of multicollinearity among the explanatory variables.

4.3 Unit Root Test

Standard procedure in literature suggests time series variables be checked for unit roots before estimating any equations as most time series data possess the propensity to fluctuate overtime. If a unit root exists in any variable, then that particular series is considered to be non-stationary. Estimations based on non-stationary variables may lead to misleading results (Pindyck and Daniel, 1998).

Table 4.3 Augmented Dickey Fuller Unit Root Test for All Study Variables

		Augmented Dickey Fuller Test				
		T-statistics at Levels		T-statistics at First Difference		
	SIC	With Intercept Only	With intercept & trend	With Intercept Only	With intercept & trend	I(0) or I(1)
LNSMR	2	-7.37***	-7.36***	-13.88***	-13.83***	I(0) / I(1)
LNIR	2	-2.20	-1.97	-6.44***	-6.46***	I(1)
LNCPI	2	-1.58	-1.62	-7.86***	-7.83***	I(1)
LNM2	2	-1.78	-1.88	-11.55***	-11.51**	I(1)
LNEX	2	-0.13	-2.56	-4.83***	-4.84***	I(1)
LNTV	2	-11.12***	-11.53***	-10.03***	-10.01***	I(0) / I(1)
LNMC	2	-4.70***	-7.69***	-11.03***	-11.01***	I(0) / I(1)

Notes: Significance at: *10, **5 and ***1 percent levels. The significance of interest is 1% and 5%. The 10% is just for reference. SIC is optimal lag selected by Schwarz information criterion.

Source: Author's Estimation (2020)

The ARDL estimation technique has a unique ability to generate reliable estimates using a mixture of variables that are stationary at level and at first difference, ie. "a mixture of variables integrated of order zero I(0) and order one I(1). The unit root test for stationarity in this study is conducted using the Augmented Dickey-Fuller test, making use of optimal lags selected by the Schwarz information criterion (SIC). The results of the test are presented in Table 4.3. The test which is initially conducted at level with intercept only and then with intercept and trend shows that all the considered variables are not stationary at level, as evidenced by their p-values being greater than the 5% level of significance at both stages of the test except in the case of stock market returns, trading volume and market capitalization. The test conducted at first difference however shows that all the variables used in the study are stationary after first differencing. The results are therefore indicative that aside for stock market returns, trading volume and market capitalization which are integrated of both order zero I(0) and one I(1), all the other study variables are integrated of the order one I(1). Given that the ARDL can work efficiently with only I(0) or I(1)" or a mixture of the two, the study proceeds with the analyses using all the study variables.

4.4 Cointegration Test

The cointegration test is performed to determine the existence or absence of long relationships among the selected variables in the model. The existence of cointegration among the variables when stock market returns is the dependent variable should authorize the estimation of the long-run model in addition to the short-run model. The cointegration test is performed using the bounds test and the estimated F-statistic with the associated critical values are presented in Table 4.4. The F-statistic as observed from Table 4.4 is higher than the upper bound critical value at 1% level of significance, using unrestricted constant and no trend.

Table 4.4 Bounds Test for Cointegration

F-Statistic	Significance	Critical Values	
		Lower Bound	Upper Bound
10.32***	10%	2.12	3.23
	5%	2.45	3.61
	2.50%	2.75	3.99
	1%	3.15	4.43

Note: *** implies rejection of the null hypothesis at 1% level
of significance.
Source: Author's Estimation (2020)

The result implies that the null hypothesis of no cointegration is rejected confirming the existence of a cointegrating relationship among the variables when stock market returns is the dependent variable. The results therefore suggest that both long and short run models can be estimated in this study in a bid to understand the dynamic nature of relationships between Ghana's stock market performance and changes in macroeconomic activity.

4.5 Long-Run Analysis

In order to assess the nature of long-run relationships existing between stock market returns and macroeconomic factors, long run estimates are generated using the ARDL approach. Given that "prior literature has identified other significant factors that have the tendency to influence the performance of the stock market, the study includes control variables such as market liquidity proxied trading volume and market size measured by market capitalization in the ARDL model in a bid to adequately explain Ghana's stock market performance. The empirical results reported in Table 4.5 reveal that interest rate movements have had a negative and significant long-run effect on the country's stock market performance over the twelve year period of the study. Specifically

the results demonstrate that a 1% increase in interest rates depress stock market returns by some 2.71% in the long run holding all other factors constant. The results on the other variables find stock market performance proxied by market returns to share a statistically significant positive relationship with money supply in the long-run whilst also finding exchange rate to share a significant negative long-run relationship with economic growth. The results specifically indicate that whilst a 1% increase in money supply increase market performance by 1.47% in the long run, a percentage increase in the exchange rate (representing 1% depreciation) causes market performance to decline by 3.63% in the long run, holding all other factors constant. Concerning the control variables, increases in trading volume is observed to exert significant positive influences on the performance of the stock market in the long run, with 1% increases in the variable causing market performance to surge by 0.19%, holding all other factors constant. The inflation rate is however found statistically insignificant to the stock market's performance over the period understudy. A similar narrative is observed concerning market capitalization.

Table 4.5 Estimated Long Run Coefficients using the ARDL Technique

	Coefficient	Standard Error	Test Statistic	P- Value
LNIR	-2.7077*	1.5456	-1.7518	0.0821
LNIR(-1)	1.9345	1.5342	1.2609	0.2096
LNCPI	0.1154	0.2957	0.3904	0.6969
LNCPI(-1)	2.7897	2.0658	1.3504	0.1792
LNM2	1.4692***	0.4158	3.5333	0.0006
LNEX	-3.6300***	0.7000	-5.1567	0.0067
LNTV	0.1934**	0.0875	2.2577	0.0256
LNMC	-0.0601	0.0875	-0.6870	0.4933
LNMC(-1)	-0.0621	0.0545	1.1395	0.2565

Notes: Results are based on ARDL(1,1,1,0,0,0,1) selected based on Schwarz Information Criterion. Dependent variable is stock market returns. *, ** and *** indicate significance at: 10*, 5** and 1*** percent levels.

The negative and significant long-run relationship observed between stock market performance and interest rates is unsurprising as the finding is in line with financial theory as well as findings from extant empirical literature including Bjornland and Leitemo (2009) and Barakat, Elgazzar and Hanafy (2015) who establish the same results for Singapore and Egypt respectively. The finding is rationalized by considering the fact that increases in interest rates connote a higher discount factor which consequently depresses stock prices. Explaining further, interest rates during the sample period may have affected stock prices via its effect on equity demand and corporate profitability. Higher interest rates (representing the opportunity cost) possess the potential to influence investors to substitute equities in their portfolio with other financial assets, thereby decreasing the demand for stocks. Decreases in demand consequently exert a downward pressure on market prices. In addition, rising interest rates impose higher financing costs on corporations, resulting in decreased profitability and declining stock prices.

Continuing the discussion on the reaction of stock market performance to the depreciations of the Ghanaian cedi (exchange rates), the study's finding of a significant negative long-run nexus between the two variables is also consistent with economic theory as well as the study of Dornbusch and Fischer's (1980)". A quick glance at the country's exchange rate trajectory shows a steady depreciation of the Ghana cedi from the year 2000 to present having depreciated 88.1% by 2018. Currency depreciations affect local Ghanaian businesses (listed on the stock market) that import raw materials and other intermediate goods as the depreciations increase the cost of production of these local businesses and decrease their ability to compete with foreign businesses. Continual increases in production costs stifle growth and expansion potentials, exert downward pressures on profit and drive down stock prices and returns. Extending the argument, it is worthy

to note that currency depreciations may not only affect the performance of import dependent businesses on the stock market but also the profits and performance of businesses within the country who borrow extensively in foreign currency. Currency depreciations increase the value of a business's external debt, making repayment of both the loan and its interests difficult. This potentially exposes the firm to the risk of bankruptcy and consequently drives down its equity prices returns.

The positive relationship observed to exist between money supply and stock market returns in the long run is consistent with the modern quantity theory postulated by Friedman and Schwartz (1963) and supported by the empirical works of Dhakal et al., (1993) and Pakistan, Hasan and Javed (2009). In explaining the rationale behind positive relationship discovered, one would have to consider the fact that relative to other securities included in a portfolio, the equilibrium position of money changes when the supply of money in the economy increases. Consequently, security holders make adjustments to the proportions of assets in their portfolios taking the form of money balances. These adjustments alter the level of demand for securities that compete with money balances like common stock. Increases in the supply of money is therefore is anticipated to cause an excess supply of money balances resulting in an excess demand for common stock. The prices of shares are thus projected to increase in this scenario increasing market returns. Additionally, as increases in the supply of money implies that borrowers such as government have lower cash needs, there is less pressure on interest rates. The reduction in interest rates provides firms with needed funds at lower cost. This may consequently increase production levels as well as profit levels driving up share values.

Concerning the control factors employed in the study, market liquidity represented by trading volume in the Ghana stock exchange is observed to impact positively on the performance of the market in the long run. The positive relationship observed between the variables is in line with Pathirawasam (2011). Justifiably, increasing liquidity in the Ghanaian stock market enhances the stock market in its ability to attract more investors which in itself could cause demand of equities to surge, increasing prices and returns. In another view, the positive relationship observed in Ghana's market may be because of the presence of rational investors in the market whose request for premiums as compensation for illiquidity decimates as the market improves in liquidity. The continuous reduction in the discount factor for valuing shares on the market due to the increasing liquidity drives up share prices and returns.

4.6 Short-Run Analysis

Continuing the investigation of the dynamic impact of macroeconomic factors on stock market performance, the study now proceeds to examine the short run effects of the selected economic fundamentals on market returns with the inclusion of an error correction term in the ARDL framework. The results of the short run analyses are presented in Table 4.6.

The results presented in Table 4.6 reveal that the coefficient of the error correction term is negative and statistically significant confirming the existence of the long run equilibrium relationship among the variables as earlier suggested by the cointegration test. The value of the error correction term strongly suggests that disequilibrium caused by shocks in the variables in a particular month dissipate and the market converges back to equilibrium after almost two months. Specifically, the results indicate stock market performance in Ghana will converge back to equilibrium in the long

run, adjusting with a speed of approximately 54% after receiving a shock in the short run. This depicts moderately a high speed of adjustment in the long run.

Table 4.6 Error Correction Representation for the Selected ARDL Model

	Coefficient	Standard Error	Test Statistic	P- Value
Intercept	2.7897***	0.3266	8.5419	0.0000
LNIR	-1.2692***	0.2511	-5.0546	0.0003
LNCPI	0.1012	0.7323	0.1382	0.4256
LNMC	-0.0523	0.0401	-1.3042	0.3823
ECM(-1)	-54.2700***	4.8700	-11.1437	0.0009

Notes: Results are based on ARDL(1,1,1,0,0,0,1) selected based on Schwarz Information Criterion. Dependent variable is stock market returns. *, ** and *** indicate significance at: 10*, 5** and 1*** percent levels.

The results show a strongly significant negative relationship between interest rates and stock market performance in the short run. A 1% increase in interest rates is seen to decrease stock market returns by 1.26% *ceteris paribus*. Though the magnitude of the impact is weaker in the short than in the long run, the result corroborates the earlier finding on the variables in the long run analyses. The finding stresses the importance of interest rate management on the part of the bank of Ghana to the performance of the Ghanaian stock market. Money supply, exchange rate as well as trading volume are not seen to share any relationship with stock market returns in the short run as the short run model fails to capture any relationship between them. Inflation and market size are however captured by the model but are found to have insignificant relations with market returns in the short run. The short run analyses therefore suggest that market performance could be enhanced through the management of interest rates.

4.7 Diagnostics Tests

The goodness of fit observed for the obtained model is appreciably high, "recording an R-square value of 95%. This is unsurprising considering the ARDL model has the lagged value of the explained variable incorporated in the model. A number of diagnostics tests have been applied to the ARDL model in so as to ascertain the robustness of the model, with results presented in Table 4.7. The test for autocorrelation is carried out utilizing the Breusch-Godfrey serial correlation LM test whilst the Breusch-Pagan-Godfrey test is used in conducting the test for heteroscedasticity.

Table 4.7 ARDL-ECM Model Diagnostic Tests

$R^2 = 0.95$, Adjusted $R^2 = 0.92$

Serial Correlation: $X^2 = 1.141$ (0.552)   Normality: $X^2 = 0.278$ (0.870)

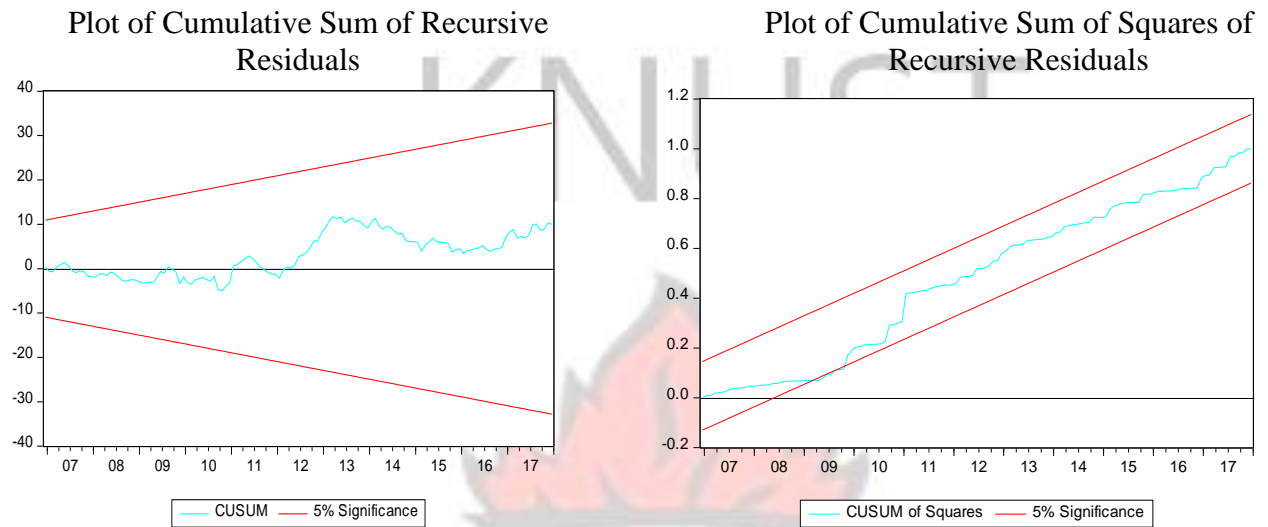Functional Form: $X^2 = 0.124$ (0.758)   Heteroscedasticity: $X^2 = 0.655$ (0.749)

Notes: Values in parentheses () represent p-values of the test statistic X^2.

Source: **Author's Estimation (2020)**

The residual terms of the model are found to be void of both autocorrelation and heteroscedasticity as the F-statistics of both tests are observed to be statistically insignificant. The Ramsey-reset stability test results also suggest that the functional form of the model is without any errors, verifying the appropriate specification of the model. The statistical insignificance of the Jarque-Bera test statistic also reveals normality in the distribution of the residual terms. Figure 4.1 shows the CUSUM and CUSUMSQ stability test results." The CUSUM and CUSUMSQ are observed to stay within the critical confines of the 5% significant level. This demonstrates the stability of both the short and long run coefficients in the estimated short and long run model. These statistics give confirmation to the robustness of the estimated model and approves the reliability of the results.

Figure 4.1 Plot of CUSUM and CUSUMQ for coefficient stability for Error Correction Model

Plot of Cumulative Sum of Recursive Residuals

Plot of Cumulative Sum of Squares of Recursive Residuals

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter summarizes the major findings and provides conclusions. Thereafter, recommendations are presented after which suggestions for future studies are made.

5.1 Summary of Key Findings

This study set out to investigate how changes in macroeconomic fundamentals –money supply, interest rates, inflation and exchange rates affect the performance of the Ghana stock exchange in both the short and long run. Employing an autoregressive distributed lag (ARDL) model in the analysis of data, the study finds that the performance of the Ghanaian stock market shares some significant short and long run relations with domestic macroeconomic factors.

First, the study found that market returns on the Ghana stock exchange share significant negative long run relationships with their domestic interest rates. This suggests that increases in interest rates lead to a decline in market returns in the long run possibly due to their potential to influence investors to substitute equities in their portfolio with other financial assets. A further analysis by the error correction representation of the ARDL model corroborates the finding of a significant nexus between interest rates and market returns by revealing a significant short run nexus between interest rates to market returns.

Upon establishing that interest rates significantly affects market returns, the study further observed market returns on the GSE are significantly influenced by movements in exchange rates. A

negative significant long run relationship found between exchange rates and market returns suggesting that, in the long run, the depreciations of the Ghanaian cedi decrease the return of the Ghanaian market whilst the converse occurs during appreciations. This observation may be due to the potential of currency depreciations to increase production costs for import dependent businesses and increase the value of external debt for businesses within the country who borrow extensively in foreign currency. Continual depreciations therefore stifle growth and expansion potentials, exert downward pressures on profit and drive down stock prices and returns. Exchange rate movements were however found to share no significant relations with market returns in the short run.

The study also observed a significant positive relationship between market returns and money supply in the long run. The finding implies that increases in money supply by Ghana's central bank result in improvements in the Ghanaian stock market returns. This may among other reasons be rationalized by considering the fact that as increases in the supply of money implies that borrowers such as government have lower cash needs, there is less pressure on interest rates. The reduction in interest rates provides firms with needed funds at lower cost. This may consequently increase production levels as well as profit levels driving up share values. The variable is however seen to lack explanatory power on market returns in the short run.

Amongst the control variables selected for the study, only changes in market liquidity represented by trading volume is found to share significant relations with market returns. The study finds that an increase in market liquidity stimulates the performance of the Ghanaian market in the long run. Rationally, increasing liquidity in the Ghanaian stock market enhances the stock market in its

ability to attract more investors which in itself could cause demand of equities to surge, increasing prices and returns. Insignificant relations are however found between the variables in the short run.

5.2 Conclusion

This study focused on examining the impact of macroeconomic fundamentals on the performance of the Ghanaian equity market. The study utilized an autoregressive distributed lags (ARDL) model to analyse monthly data covering period September "2005 to December 2017 in a bid to understand how macroeconomic fundamentals including money supply, inflation, interest rates and exchange rates explain the movements in Ghana's stock market returns. The results from the long run analysis of the ARDL reveal that interest rates and exchange rates both share negative significant long run relationships with returns from Ghana's equity market. The findings imply that increases in interest rates in the Ghanaian economy will trigger a fall in market returns whilst increases in the nominal exchange rates representing currency depreciations will also lead to a decline in market performance all in the long run. Further, the long run analysis suggests that expansionary monetary policies in Ghana exert upward pressures on stock prices and by extension market returns through the revelation of a positive relationship between money supply and market returns in the long run. The study also finds that improvements in Ghana's market liquidity is having the desired effect of increasing market returns possibly through the resulting decline in discount factors. The results of the error correction representation of the ARDL suggest that in the short run, market performance in Ghana is influenced by movements in the interest rate, suggesting that interest rate can be used as channel for enhancing performance in the short term. Furthermore, the error correction term for the Ghanaian market demonstrates that the Ghana stock market converges to its equilibrium within almost two months after being shocked; adjusting by about

54.3% each month. The results generally suggest that changes interest rates, money supply, and exchange rates influence the direction of market return movements in Ghana giving the implication that fluctuations in these identified variables should generally be considered in making investment decisions in the Ghanaian market. The results from the autoregressive distributed lags model confirm Fama's (1981) postulations that equity price movements are sensitive to changes in macroeconomic activity." The results holds implications for security pricing in Ghana, specifically indicating that money supply, interest rate and exchange rate are relevant in the valuation of securities in Ghana's market. The study thus provides evidence in support of the arbitrage pricing theory pointing to the aforementioned economic factors as having significant influences on market returns.

5.3 RECOMMENDATION

Based on the finding of both short and long run significant relationships between interest rates and stock market returns, the bank of Ghana in their capacity as managers of the country's monetary policy can use both short term and long term interest rate policies to induce the performance of the Ghanaian market either in the short or long run. Investors and market participants seeking either short term or long term investment opportunities in Ghana's stock market should also observe interest rate movements so as to appropriately price securities and make informed investment decisions.

Having discovered that continual depreciation of the Ghana cedi exerts a downward pressure on market performance and vice versa in the long-run, the central bank should in addition to recent actions such as the foreign exchange forward auctions formulate and implement effective policies

aimed at currency appreciations. Government in supporting the central bank achieve this should place more restrictions on imports while creating a conducive atmosphere to increase exports.

Additionally, since an increase in money supply which increases the liquidity of the economy is found to increase market performance in the long-run, the study recommends that the pursuance of expansionary monetary policies should be considered by the central bank in periods of declining equity market performance. Regulators of the equity market should similarly role out policies that will create a conducive environment for the enhancement of market liquidity as increases in the variable is seen to increase market performance.

Finally, future studies should attempt to investigate how qualitative variables like political events, changes in legislature as well as economic agreements influence the performance of Ghana's stock market as these may also affect investor sentiment and consequently market returns. A comparative study of the asymmetric reactions of different equity portfolios to similar economic factors may also be worthwhile to investors in their asset selection decisions.

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