UNIVERSITY OF CAPE COAST

INTERRELATIONSHIP BETWEEN STOCK PRICE INDEX AND MACROECONOMIC VARIABLES: A CASE OF GHANA

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BY

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THESIS SUBMITTED TO THE DEPARTMENT OF ECONOMICS OF THE FACULTY OF SOCIAL SCIENCES, UNIVERSITY OF CAPE COAST, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR AWARD OF MASTER OF PHILOSOPHY DEGREE IN ECONOMICS

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature:……. Date:…….……

Name: Joy Say

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature:…….. Date:……...

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ABSTRACT

The study sought to investigate the interrelationship between stock price index and macroeconomic variables taking Ghana as a case using the cointegration, vector error correction (VEC) and vector auto regression (VAR) approaches.

Annual data covering the period 1991-2006 on real GDP, All-shares index, consumption, investment and consumption shares of real GDP was collected, interpolated into quarterly series for the analysis and used for the study.

The outcome of the study showed that the real GDP is determined by consumption, investment and government activities. The index is influenced by changes in the real GDP, government activities and lags of the index itself. Investment is determined by the All-shares index and changes in consumption are accounted for by changes in government activities, the market index and lags of consumption. Bidirectional causality was found between the index and investment and a unidirectional causality was found between the index and activities of the real sector.

The cointegration between the market index and the macroeconomic variables suggests that for a better market performance which has the tendency of increasing investor confidence in the capital market and investment, government should put measures in place that seek to ensure a stable macroeconomy.

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DEDICATION

To my lovely Say family and Sena

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LIST OF ACRONYMS

ADF	Augmented Dickey-Fuller
AERC	African Economic Research Consortium
AIC	Akaike Information Criterion
APT	Arbitrage Pricing Theory
ARCH	Autoregressive Conditional Heteroscedasticity
ARDL	Autoregressive Distributed Lag Model
ASI	All-Shares Index
CLS	Conditional Least Square
CT	Corporate Tax Rate
ECM	Error Correction Model
EGARCH	Exponential Generalised Autoregressive Conditional Heteroscedasticity
FMOLS	Fully Modified Ordinary List Square
GIPC	Ghana Investments Promotion Centre
GSE	Ghana Stock Exchange
HQ	Hannan and Quinn
IRS	Internal Revenue Service
LM2	Log of Money Supply
LRC	Log of Consumption Share of Real GDP
LRG	Log of Government Share of Real GDP
LRGDP	Log of Real Domestic Product
LRI	Log of Investment share of Real Gross Domestic Product

OLS	Ordinary Least Square
PP	Phillips-Perron
PWT	PennWorld Tables
RC	Consumption share of Real Gross Domestic Product
RG	Government Share of Real Gross Domestic Product
RGDP	Real Gross Domestic Product
RGDP	Real Gross Domestic Product
RI	Investment share of Real Gross Domestic Product
SAP	Structural Adjustment Programme
SBC	Schwartz Bayesian Criterion
SEC	Securities and Exchange Commission
SIC	Swartz Information Criterion
SSA	Sub-Saharan Africa
UECM	Unrestricted Error Correction Model
UK	United Kingdom
USA	United States of America
VAR	Vector Autoregressive
VEC	Vector Error Correction
VECM	Vector Error Correction Model
WDI	World Development Indicator

CHAPTER ONE

INTRODUCTION

Background to the study

The increasing noise about the developments in the capital markets of developing countries has evolved as a dominant process recently in the world's financial arena. Despite the flourishing world stock markets, markets in the developing world constitute just a minute fraction of this growth. The increasing migration of capital from developed market to emerging markets and associate high return as noted by Ushad, Fawdar, and Sannasse (2008) and Osinubi (2004), can be attributed to the increasing integration of emerging markets into the world's markets in the 1990s as noted by Korajczyk (1996).

Emerging markets are attracting many international investors. Portfolio inflows increased tenfold over the recent years. Domestic stock markets grew considerably in size due to the enormous financial sector reforms undertaken as part of the Structural Adjustment Programs (SAPs) of the 1980s. The SAPs saw increasing privatisation of state owned companies to reduce the role of the state in the economy, thus the development of stock markets to facilitate this process. These stock markets were also aimed to introducing new ownership structures determined by market prices.

Thus developments in the stock markets are expected to have a great impact on the economy by creating efficiency in resource distribution in these developing countries.

The role of financial markets in economic growth and stability has, for many years, been the subject of intense discussion and debate among both academicians and policy makers. The mainstream view is that financial market development exerts a large positive impact on economic growth (Beck, Demirguc-kunt & Levine, 2001; Levine & Zervos, 1998; Schumpeter, 1912) but Traditional growth theorists believed that there is no correlation between stock market development and economic growth because of the presence of level effect not the *rate* effect. Similarly, Singh (1997) contended that stock markets are not necessary institutions for achieving high levels of economic development. Many viewed stock market as a agent that harm economic development due to their susceptibility to market failure, which is often manifest in the volatile nature of stock markets in many developing countries (Singh, 1997; Singh & Weisse, 1998).

Among the many questions that emerged out of these debates are these two key questions: First, are stock prices or share price movements influenced by economic activity or are they determined on the basis of speculative bubbles? Second, to what extent does the stock market performance as a macroeconomic indicator affect the prospects for economic growth?

There are a lot of studies about the connection between stock prices fluctuations and economic growth as well as other economic variables which have

detected that changes in stock prices reflect real economic situation. Economic growth through the changes in levels of real economic activities affects profitability and activity of firms. As a result, with changes in profitability prospects, expected earnings and dividends of shares, stock prices fluctuate (Fama, 1990; Ferson & Harvey, 1993; Cheung & Ng, 1998; Mauro, 2003; Ritter, 2004; Liu & Sinclair, 2008; Shahbaz, Ahmed, & Ali, 2008).

On the other hand, other studies have examined the impact of stock prices on macroeconomics indicators. According to the results of these investigations share prices fluctuations play a role in directing economic activities in the medium and long term. Stock prices reflect the expectation of public towards the future economic activity. In other words, the stock market is forward-looking and stock prices reflect anticipations about future economic activity. If a recession is expected, for example, then stock prices reflect this by decreasing in value whereas large increase in stock prices may reflect the expectation towards future economic growth (Jefferis & Okeahalam; 2000; Nasseh & Strauss, 2000; Mauro, 2003; Adajaski & Biekpe, 2005; Mun, Siong, & Long , 2008).

The issue whether stock market affect, leads or lags economic activity will be very crucial in Ghana as the stock market has gained much attraction in the last few years. The market has been, in general, among the best performing markets in Africa (Adam & Tuenebaoh, 2008). The Ghana Stock Exchange (GSE) was incorporated in July 1989 as a company limited by guarantee. The need for a stock exchange for Ghana had been considered as far back as 1968; a rudimentary market was set up in 1971 but it experienced a false start. Trading on the GSE

actually commenced on 12 November 1990 with 11 listed companies. This number has grown to 35 listed companies and 2 corporate debt instruments and a host of government instruments over the 19 year period, a rate of about two companies per year. The slow pace of listing on the GSE could reflect the pace of growth of the capital market of Ghana.

Despite this slow growth pace, indicators like market capitalisation, trading volume, the market index have shown phenomenal growth prior to the credit crunch. These developments are often claimed by the authorities to be an indication of economic progress of the country. It would be useful to examine whether these claims are true with particular reference to the real sector. Moreover, the relationship between stock prices and the real sector variables is also important in view of the burst of Ghana's financial sector. Generally, measures such as economic liberalisation, privatisation, relaxation of foreign exchange controls, and in particular the opening of the stock markets to international investors is supposed to have great impacts on the economy including the real sector.

In this context, the causal analysis between the stock market variables, e.g., stock prices, market capitalisation, etc., and the variables, for instance, representing the real sector of the economy like real gross domestic product, real consumption expenditures, and real investment spending, would provide useful insights regarding the role of the stock market in the development of the Ghanaian economy.

In other words, we can examine whether changes in stock market variables cause fluctuations in the real sector implying that stock market leads economic activity or are not caused by the real variables indicating that it lags economic activity.

The theoretical basis to examine the link between stock prices and the real variables are well established in economic literature, e.g., in Baumol (1965), Bosworth (1975). The relationship between stock prices and real consumption expenditures, for instance, is based on the life cycle theory, developed by Ando and Modigliani (1963), which states that individuals base their consumption decision on their expected life time wealth. Part of their wealth may be held in the form of stocks linking stock price changes to changes in consumption expenditure. Similarly, the relationship between stock prices and investment spending is based on the q theory of Tobin (1969), where q is the ratio of total market value of firms to the replacement cost of their existing capital stock at current prices. Finally, the relationship between stock prices and GDP, a measure of economic activity, indicates whether the stock market leads or lags economic activity.

Preliminary researches have been done in markets using different approaches to investigate such relationship between stock prices and macroeconomic variables. For example, how some macroeconomic variable explain US stock market movement was studied by Chen et al. (1986) using Arbitrage Pricing Theory, developed by Ross (1976).Researchers such as Cheung & Ng (1998), Mukherjee & Naka (1995), Kwon & Shin (1999) and Mayasmai &

Koh (2000) have employed cointegration analysis to examine the relationships between stock returns and macroeconomic variables in developed countries like Japan, US, Australia, Canada and European countries.

Other empirical evidence from developing markets in Asia regarding the direction of causality between stock prices and the real variables is not conclusive. For example, a unidirectional causality from stock prices to consumption expenditures is observed by Nishat and Saghir (1991) in Pakistan and Ahmed (1999) in Bangladesh whereas Mookerjee (1988) observes the opposite case in India. Similarly, Mookerjee (1988) and Ahmed (1999) report a unidirectional causality from stock prices to investment spending for India and Bangladesh respectively whereas the opposite case is reported by Nishat and Saghir (1991) for Pakistan. Regarding causal relation between stock prices and economic activity Mookerjee (1988) finds evidence that GDP leads stock prices in India whereas Nishat and Saghir (1991) find the opposite evidence in Pakistan. On the other hand, Ahmed (1999) finds the evidence that Index of Industrial Production (IIP) leads stock prices in Bangladesh. In another study for Pakistan, Husain and Mahmood (2001), covering the data from 1959/60 to 1998/99 report a uni-directional causality from the macro economic variables, GDP, consumption, investments, to stock prices implying that the stock market lags economic activity and thus cannot be characterised as the leading indicator of the economy in Pakistan.

In spite of increasing migration of capital from developed market to emerging markets and associate high return (Ushad, et al ,2008 ; Osinubi, 2004),

emerging stock markets including that of Ghana have not been well studied. Adam and Twenebaoh (2008), in their study of the role of macroeconomic indicators in stock price movement in Ghana concluded that there is a long run relationship between stock prices and such macroeconomic indicators as inflation, inward FDI, exchange rate and interest rate.

The growing interest and the performance of emerging markets have been attributed to the conduct of sound macroeconomic policies, privatisation, stock market reform and financial liberalisation. In 1993 and 1994 when privatisation and divestiture of state-owned enterprise increased in Ghana, Ghana stock market (GSE) emerged as sixth and best emerging stock market respectively (Adam & Twenebaoh, 2008). The stock market performed poorly between 1995 and 2000 when interest rate and inflation were high and started recovery following sound macroeconomic policies resulting in economic stability.

This casual observation of data reveals a relationship of a sort between changes in stock prices and changes in the macro economy of Ghana. The global economic crises which led to the poor performance of many economies coupled with the poor performance of the Ghana Stock Exchange during this period further strengthen the case.

This study thus aims at adding to existing literature by studying the relationship between stock prices movements and the real sector of Ghana. By this, the study seeks to explore the interrelationships that exist between stock prices and such macroeconomic variables as GDP, consumption share of real

GDP, investment share of real GDP, government share of real GDP, money supply and corporate tax rate.

Late this century, a new trend emerged in the financial front in Sub-Saharan Africa (SSA): the national stock exchange. There were 12 operating stock markets in SSA with a total market capitalisation of over US$291 billion. The emergence of new markets and the boom of the older ones can largely be accounted for by the shift in ideology among Africa's policymakers. Many African countries around the 1980s discarded the tight state control and moved aggressively towards capitalism which was perceived to be the bridge towards growth and development. The loose on the economy by the policymakers was also made necessary by the collapse of socialist models and increasing pressure and influence from international financial institutions (mostly the International Monetary Fund and the World Bank). This also led greatly to the liberalisation of the investment environment.

African markets have experienced much gain in recent years as market capitalization and new listing increased with development in technology and a stride towards much efficiency. The stock markets are expected to facilitate the increasing privatisation of state owned enterprises by facilitating the floatation of shares. It was further expected to help increase capital available to new and emerging African enterprises. The most successful and notable example in terms of privatisation was that of Ghana's Ashanti Goldfields, the biggest mining company in SSA outside South Africa. The share of the new company (AngloGold Ashanti Ltd) was subsequently listed on the Ghana, Zambia and

London Stock exchanges. Another well known and successful example is the privatisation of Kenya Airways in 1996. African equity markets rank among the best-performing markets between 1993 and 1996, with the Ghana Stock Exchange (GSE) being ranked the 6th best performing market in 1996 (Adam & Tweneboah, 2008). Baring Securities in 1994, for example classified Africa as "one of the best equity regimes".

Fund managers in these African markets express concern over several regulatory and institutional impediments that are notable in new and emerging markets and this hampers investments in Africa. Contentious efforts are been made by authorities SSA to nib these irregularities. Several laws and legislative instruments govern the operations in Ghana, Nigeria, Zimbabwe and Zambia. The developing nature of these bourses still leaves the trading procedures, pricing mechanisms, clearing and settlement, share registration and custodian practice a bit outdated. Despite the high profile and popularity of some SSA markets on the global financial front, most exchanges in SSA still suffer from the classical emerging market problems: too few stocks, poor liquidity, slow settlement, antiquated systems and lack of local investors. In this vein, exchanges such as the GSE, the Nigeria Stock Exchange etc, have introduce automated trading, depository accounts and electronic custodian service in order to curb some of these problems.

The growth of African markets has been hampered with several factors including complex government restrictions, dearth of saving institutions and a limited supply of shares. The desire for well functioning stock markets in Africa

cannot be overestimated since they are a potential source of investor confidence as African countries seek to become market based economy. Although it is much reasonable to ask whether the continent's current acceptance of international markets is a permanent change or merely the "economic wave of the era", Africa seems to have little choice for the foreseeable future but to follow liberalisation adjustment policies with stock markets being a visible symptom and tool. A well operating stock exchange serves as a medium via which private sector can be expanded and credibility of investors built.

Increasing technology and globalisation of capital markets are mixed blessings from the African perspective. The interdependence of global markets and the ability to move capital more swiftly across borders can bring more funds into Africa but these factors at the same time makes the markets very volatile and more susceptible to shocks. The Mexican 'Peso Crisis' of 1994/1995 is a classical example of this case. Even though it could be argued that the African markets can withstand these shocks as they increase in depth and breath, they are clearly unstable in the short to medium term. Low savings, over reliance on primary commodities and external inputs in addition the size of African economies make them highly exposed to shocks. In the instance of bad shocks investors can be scared away in addition to stunting growth. These affect the stock markets extensively and hence slumming prices of listed equities.

It is believed that stock market are not the only source of development but one of the key ingredients in the growth and development agenda especially in the African case. By themselves, stock markets can do little in fostering growth but if

combined with good governance, sound macroeconomic environment and well developed industry base among others, stock market can be of enormous help in transferring funds from surplus units to deficit units.

With the emergence of stock markets in Africa, came fund managers who use their extensive knowledge of financial markets to help players make the most of the markets. Despite the small size of these markets and the associated small activities, these market players employ highly sophisticated skills to play the market. The market thus is characterised by players engaging in both fundamental and technical stock analysis but the fundamental analysis dominates most of these markets due to the perceived strong link between the market and economy's fundamentals.

The discussion thus far paints a clear picture of all the economy's stakeholders, starting from policymakers to the small player on the stock exchange, doing their best in Africa to see the stock markets on the continent play the expected role and hence aiding growth and development.

The idea of establishing a stock exchange in Ghana dates back to 1968; the idea led to the to the promulgation of the Stock Market Act of 1971, which laid the foundation for the establishment of the Accra Stock Market Limited (ASML) in 1971. Unfavourable macroeconomic environment, political instability and lack of government support undermined the take off of Accra Stock Market Limited (ASML) remained a mirage. In spite of these early setbacks, two stock brokerage firms, namely National Trust Holding Company Ltd (NTHC) and National Stockbrokers Ltd, now Merban Stockbrokers prior to the establishment

of the Ghana Stock Exchange in November 1990, did over-the-counter (OTC) trading in shares of some foreign-owned companies.

Under the surveillance of the IMF and World Bank, Ghana underwent structural reforms in 1983 to remove distortions in the economy together with other financial reforms including but not limited to deregulation of interest rates, removal of credit controls, and floating of exchange rates. After the financial liberalisation and the divestiture of a host of state owned enterprise the need for stock market in Ghana became unavoidable.

The Ghana Stock Exchange was incorporated in July 1989 as a private company under the Ghana companies' code, 1963(Act179). However, the status of the company was changed to a public company under the company's Code in April 1994.The exchange was given recognition as an authorised stock exchange under the stock Exchange Act of 1971.Trading on the floor of the exchange commenced on November 12, 1990. The number of listed equities increased to 13 in 1991; 19 in 1995; 32 in 2007 and 35 in 2010 (GSE, 2010). The increase in the number of listings has also reflected in market capitalisation being GH□2.9m in 1991, GH□239.90 in 1995, GH□12,368.60m in 2007 and GH□18,982.61m as at November 2010. The Ghana stock market was voted sixth and best performing emerging market in 1993 and 1994 respectively (GSE quarterly bulletin, March 1995). The GSE capital appreciated by 116% in 1993 and gained 124.34% in its index level in 1994 (GSE, 1995), it depreciated to16.55% in 2000, went up again to 154.67% in 2003 and gaining 27.44% as at November 2010. In 1995, the index grew 6.33%, this abysmal performance is partly attributed to high inflation and

interest rate. At the end of 2004, market capitalization stood at US$ 2,644 million. Annual turnover ratio just remains about 3.2% in 2004, from an all-time high of 6.5% in 1998. As of 2006 the market capitalization of the Ghana Stock Exchange was about GH□286.90m, and as at the end of November 2010 the capitalization stood at GH□18982.61m (GSE, 2010). The Ghana Stock Exchange (GSE) holds trading section every working day via a three alternative levels of access

- On the trading floor of the GSE
- At the office of the stockbroker through a Wide Area Network (WAN)
- Through the internet.

The market is open to both nonresident Ghanaians and foreigners. Their activities are guided by the Foreign Exchange Act of 2006 (Act 723).

The main indices are the GSE All Share index and the Databank stock index (DSI). Three new indices comprising the SAS index (SASI), SAS Manufacturing index (SAS-MI) and the SAS Financial index (SAS-FI) have also been published by Strategic African Securities Limited.

The Ghanaian economy, the backbone of the GSE is highly dependent on cocoa and the extraction of minerals. The economy since independence relies largely on loans and grant from donor agencies for her development. The GSE operates under the Stock Exchange Act of 1971. The GSE is an integral part of the speedily developing financial market in the country comprising of Bank of Ghana as the central bank, discount houses, commercial banks, investment banks and a host of other financial institution.

The GSE with a market capitalisation of GH 20,087.18m as at November 2010, makes it possible for:

- an easy transfer of fund from surplus units to deficit units for economic growth and development
- investor to realise or vary his/her investments at any time with minimal cost and time
- companies to raise substantial long term capital fund

The GSE acts, in addition to other regulatory agencies, as a supervisor to companies listed on the exchange thereby ensuring that companies listed act in the best interest of their shareholders and the economy as a whole.

Despite the attainment of a middle income status recently, the economy of Ghana can be classed as developing and primary since its economic activities are heavily agrarian and extractive. This fact is not depicted by the companies listed on the exchange but the fact can be made that the company with the highest market capitalization is an extraction company (AngloGold Ashanti with market capitalization of GH 12920.99m). The manufacturing and brewing sectors currently dominate the exchange. A distant third is the banking sector while other listed companies fall into the insurance, mining and petroleum sectors.

Since the mid 1980s, the government of Ghana embarked on restructuring the Ghanaian economy. This led to the establishment of the Ghana stock exchange in 1989. It was deemed then that the exchange will facilitate the privatisation of a host of government enterprises. Thus in 1994 when Ashanti Goldfields Company limited got listed, the market capitalization rose from

abysmal GH□9.65m to GH□ 196.84. The market capitalisation since then has shown an upward trend as depicted in the Figure 1.

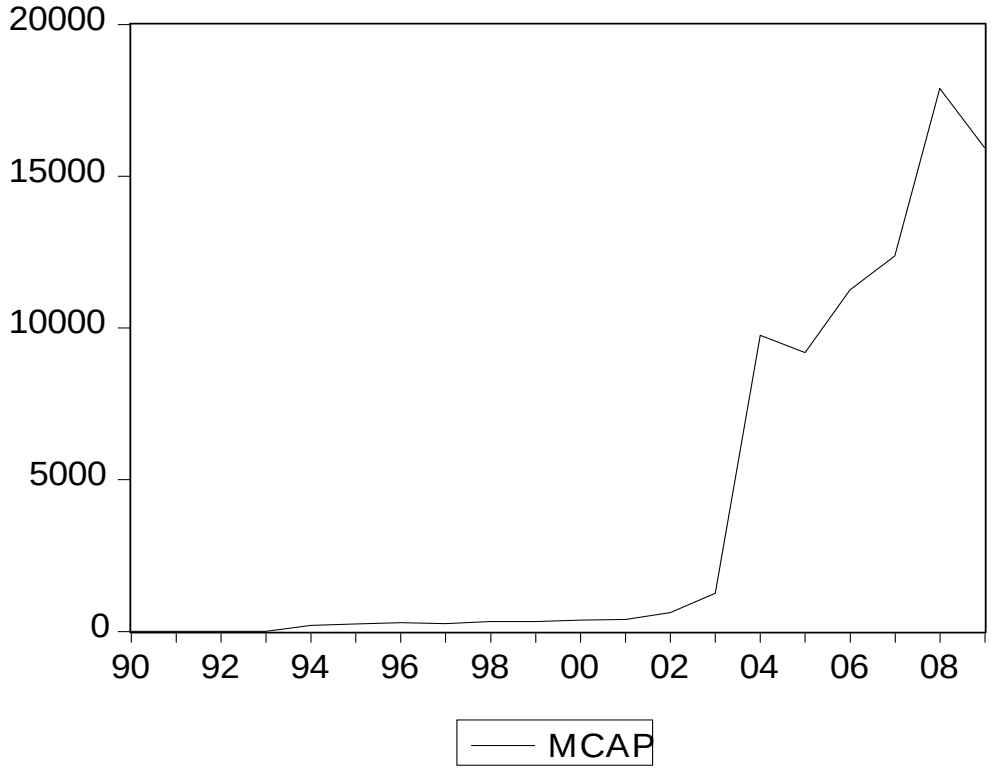

Figure 1: Trend of Market Capitalisation (MCAP)

Source: Graphed by Author using Eviews 5.0

From Figure 1, the vertical axis represents the market capitalisation in million Ghana Cedis whiles the horizontal axis represents the years. The market capitalisation between 1990 and 2003 even though showed an upward trend, was below 500 million Ghana Cedis but the upward movement took a more drastic trend between the 2003-2004 period and despite a bit of a dip between 2004-2005 the trend could generally be said to be upward.

The economy of Ghana, has been swinging from a good performance to a low that cannot be predicted with GDP growth at rates that cannot be forecasted.

It increased from 3.3% in 1991 to 5.2% in 1992 and again dropping to 3.8% in 1993. It was in these periods that the GSE was said to be at its teething stage with the GSE All-Share Index being 64.51 in 1991, 62.17 in 1992. This performance came against the background of the kind of pessimism that Ghanaian display when confronted with anything new. When eventually the GSE was observed to have come to stay, the index rose in 1993 with a listing of a host of companies especially the government enterprises.

In 1993, the story became one of good performance for both the economy and the GSE, the GDP increase up to about 5% and the All- Shares Index was 132.88 an increase of 113.74 over the previous year.

The year 1994 saw a tremendous growth in the market index which went up by 124.34% to close the year at 298.10 from the previous year's 132.88 in this same period, the real GDP growth was 3.7% a fall from the 5% realised in 1993. In as much as the market index rose by a huge margin and the real GDP declined, interest rate also declined from 35% to 33% moving from 1993 to 1993. Inflation rate increased from about 24.9% in 1993 to about 34.2% in 1994. Despite these macroeconomic indicators, the performance of the market index is largely accounted for by the increased level of divestiture and the listing of Ashanti Goldfields Company limited.

The market can be characterised as unpredictable in terms of performance from the period of 1995 to 1998 with the index declining by 15.22% in 1999. The index grew slowly through the 1995-1998 period with an abysmal 6.33% growth in 1995 and 13.85 growth in 1996. The market index inched up its performance

over the previous two years and recorded 41.85% in 1997 and 69.69% in 1998. In 1995 the end of year inflation stood at 59.5% which is a rise over the 24.9% experienced by same period in 1994. This is associated with a 4.5% change in real GDP and an interest rate of 41.5%. The weakening macro economy can largely accountable for the abysmal performance of the market index in 1995 with recovery coming in subsequent years.

Entering into the millennium, the index recovered from the depth of 1999 and recorded a 16.5% increase in the all shares index over the previous year. But the major increase in the index came in 2003-2004 when the market index changed by 154%. With a GDP growth rate of 5.6%, inflation rate of 12.6%, down from 26.7%, in 2004, there is no doubt of such a performance by the All-Shares index.

The year 2005 saw inflation inching up a bit to 15.1% from 12.6% in 2004 despite increase in the GDP growth rate from 5.6% to 5.9%. The market index in the year was 44769.02 an increase of 29.81%.

Statement of the problem

This study is being carried out with the intent on finding out the interrelationship that exists between stock prices and macroeconomic variables especially those variables measuring activities in the real sector. The study was driven by the desire to investigate whether the stock market has been able to play the role it was deemed to play in the economy, that is, to distribute income

between surplus units and deficit units thereby influencing the real sector activities.

Historically, emphasis has been put on the banking system in spurring economic growth via their intermediation activities, but little has been done on the role of stock markets in influencing growth. In developing countries such as Africa, little has been done to empirically investigate the role of stock markets in spurring economic growth despite the existence of a large volume of theoretical literature demonstrating the links between stock market development and long run economic growth.

The case of Ghana does not differ from the African and the developing country story. There has been only a few studies investigating the link between stock prices and macroeconomic variables but these studies did not focus on the real sector thus the actual link between the stock market activities and the real sector is empirically missing.

There are several categories of investor on the GSE. There are the firms who play the market in order to better their capital positions and to undertake long term real investments and there are small retail investors who play the market in order to smooth their consumption when faced with exogenous shocks. Thus this study tries to individually look at the effect of the existence of the stock market on these economic decisions and further try to answer the question as to whether stock market is related to economic growth as postulated by the volumes of theoretical literature.

Further, the global economic crises and the considerable decline in economic activities coupled with the poor performance of most exchanges including the GSE suggest that there is a relationship between variables representing stock market performance and macroeconomic variables. Thus the study seeks to deepen the understanding of the interrelationship between stock prices and macroeconomic variables especially variables representing the real sector of Ghana.

Objectives of the study

The general objective of the study is to find out the interrelationship between stock prices and macroeconomic variables. Specifically the study seeks to:

- Verify the long run and short run relationship among stock price index, real GDP, consumption and investment in Ghana.
- Identify the relative importance of real GDP, All-shares index, consumption and investment in explaining variations in each other.
- To ascertain whether the stock price index causes real GDP, investment and consumption.
- To find out whether stock market index lead real sector activities.
- To make policy recommendations

Hypotheses

H_0: There is no long run relationship between stock price index and real GDP in Ghana.

H_0: There is no long run relationship between stock price index and real consumption in Ghana.

H_0: There is no long run relationship between stock price index and real investment in Ghana.

H_0**:** Real GDP, All-shares index, consumption and investment are not important in explaining variations in each other.

H_0**:** Stock price index does not causes real GDP, investment and consumption.

H_0: Stock price index does not lead changes in real sector activities.

Significance of the study

This study is important due to the fact that understanding the linkages between capital markets and the real economy poses an important theoretical challenge for economists working in the fields of macroeconomics and finance. Improved understanding of the linkages is also important for policy-makers. The study differs from others in the fact that the few related studies conducted using the Ghana Bourse concentrated on macroeconomic indicators other than the real sector indicators (e.g. Adam & Tuenebaoh, 2008; Adjasi, Harvey, & Agyapong, 2008).

Also, the methods employed by these earlier studies suggest that only macroeconomic variables affect or impact on stock market variables but

evidences from countries such as India and Pakistan reveals a dynamic relationship between these two sets of variable (Nishat & Saghir,1991; Mookerjee,1998) making the reexamination of the relationship important.

Strengthening this argument further is the fact that empirical literature is not conclusive as to the relationship that exists between changes in the real sector of an economy and the movement of stock prices and also on whether stock price movements lead or lag changes in the real sector of an economy hence the relationship in Ghana will be a case to study.

Organisation of the study

This study is organized in five chapters. The first chapters deal with the introduction which culminates into the problem of the study, the study objectives, the hypothesis guiding the study and the significance of the study.

The second chapter deals with the review of related literature. This chapter tries to synthesis the existing theoretical and empirical literature in trying to put the study into scope. Some of the issues looked at are the relationship between financial markets and economic growth , the relationship between the real sector variables and the stock market and the relationship between some other macroeconomic variables which are meant to serve as policy variables and the stock market.

The third chapter has to do with methodology. Here the estimation technique, the theoretical and empirical models, sources of data and other related issues are discussed.

The fourth chapter deals with the estimation, results and the analysis of the results whiles the fifth chapter deals with the summary, conclusion and recommendations.

CHAPTER TWO

REVIEW LITERATURE

Introduction

This chapter reviews the related literature in trying to put the study into context. This section discusses both the theoretical and empirical literature with the view of finding the link between the variables of interest, to find out the gap and try to put the study into perspective.

Theoretical literature

This section reviews some theories that look at the interrelation between the stock index price and macroeconomic variables.

Finance and the real economy

The importance of the co-movement of the financial and the real sectors in the economic growth process has been stressed by recent research. There is the general consensus that financial activities are not just shadows of the real sector as portrayed by valuation models but key influence in trying to foster growth by reducing transaction cost. The recent fast growing research about speculative bubbles, fads and other market anomalies did little to change the facts about the relationship between finance and the real economy. The standard argument for

main stream economic theory is that the services provided by the financial sector help to promote investments and consumption needs which in turn lead to economic growth.

In the pre- Keynesian era, Schumpeter (1934) emphasized the importance of the financial sector in economic growth. Schumpeter's theory of economic growth and development exposes the co-evolution between the financial sector and the real sector in which a financial sector plays a crucial role. The discussion over Schumpeter's exposition led to a debate that seeks to answer two key questions:

- Does financial sector play a causal role in economic development?
- Does financial sector merely follow the development in the real sector?

But Robinson (1952) and Goldsmith (1969) stressed the propulsive role the financial sector can play in the process of economic development making the causality question an important issue in the debate.

The endogenous growth model was the earliest models used to link financial sector development to economic growth and development. The model positively links these two sectors of the economy (Eschenbach & Schuknecht, 2004, King & Levine, 1993; Levine & Zervos, 1996). The endogenous growth model argues that there is a two-way causal relationship between financial sector development and the long run economic growth. The financial sector influences the real sector trough two main channels: the volume of investment and the efficiency of investments. The benefits provided by financial services are due to enhancing the efficiency of financial intermediation between ultimate lenders and

borrowers by mobilizing savings, managing risk, screening and monitoring investment projects and reducing transaction cost. There are also feedback effects from economic growth to the developments in the financial sector (De Gregorio & Guidotti, 1995).

The new classical perspective

The new classical perspective view real savings as the key variable determining investment and subsequently the level of real capital and this has its effect on real consumption as well. To them an increase in savings increases the level of investment thus increasing real capital but decreases consumption since consumption and saving are all taking from the same income and both this channels have their respective effects on the level of economic growth. They noted that there could not be accumulation of financial assets independent of real investment as the financial sector "only" intermediate funds between ultimate lenders and ultimate borrowers. Causality thus runs from savings to investment which should therefore be highly correlated in real terms.

The relationship between saving and investment in the short run is likely to differ if we admit to a rising price level due to an increase in money supply. The new classical perspective postulates that there is no distinction between financial and non financial activities as they are both explained in real terms. If there are purely financial activities, such as mergers and acquisitions (M&As) or leverage buyouts (LBOs), they basically occurs because there are market inefficiencies, which are connected again to by the market forces (Jensen, 1986).

The classical economists believe that financial activities enhance the "real" efficiency of the economy as they militate against market imperfections. The main function of financial institutions is to reduce transaction cost and prevent information asymmetry for other economic agents. Financial activities thus increase the efficiency of other economic transactions and allow for optimal allocation of risk. Therefore, a positive correlation would be expected between financial sector performance and economic growths by this new classical perspective.

The exact link between finance and the real sector in the classical paradigm varies among the models presented in the literature as these models allow financial markets to solve a variety of risk and information problems. The final result is always an increase in real productivity. The classical perspective believe that financial intermediation increase productivity of real capital which in turn enables the development of complex financial structures allowing for the supply of more financial services with less resources (Greenwood & Javonivic, 1990).

However this school of thought was not clear as to the link between the stock market variables and the real sector.

Keynesian framework

Macroeconomic analyses in the Keynesian framework start form the investment decision of the firm and these decisions are made based on the profit expectation of these firms. These profit expectation in this uncertain world of ours

become the main determinant of their investments. The first important aspect of finance in the traditional Keynesian tradition is that financial institutions contribute positively to economic growth as they meet the needs for financing investments. There exists the general consensus that the availability of financial institutions influences the course of investment since it aids in relaxing financial constraints.

According to Keynesian analysis, the economy is prone to volatility and speculative bubbles as profit become either overly optimistic or pessimistic. There might be time when financial activities increase instability or grow at the expense of real activities as they offer higher returns or are considered to be less risky.

There may be negative correlation between financial activities and growth because as Keynes (1936, p.159) noted: "when the capital development of a country becomes a by-product of a casino, the job is likely to be ill-done". In this case, speculative, activities on the financial markets are supposed to exert negative influence on the prospects for channeling resources towards "a steady stream of enterprise" (Keynes, 1936, p.376). Keynes views on finance and the real sector to a rather more pessimistic turn in the Treatise of Money (1930), where his concern was with those instances when the financial sector is allowed to "steal" resources from the individual sector leading to a fall in real output. The overall impact of financial activities on economic growth, therefore, remains unsure and depends on particular circumstances. The recent developments of the financial sector propelled several investigations into Keynes' claims and Binswanger

(1999) has proposed the following hypothesis to demonstrate the recent financial trends on the real economy:

The “crowding out hypothesis”

In times when the financial assets offer higher returns than real investment projects, more money will be invested in financial capital and consequently, less money is available to finance real investment in plants and equipments, which hurts the real sector of the economy with negative multiple effects.

The “financial dominance hypothesis”

Here it is believed that important economic variables are being determined by speculative financial activities which do not reflect the “real economic conditions”. Therefore, the financial sector increasingly “dominates” the real sector as financial activities set the standard (e. g . the opportunity cost of real investments) for activities of the real sector.

The casino hypothesis

Prices on the financial markets (mainly on the stock market) do not accurately reflect the underlying fundamentals (real variables) when speculative bubbles emerge on those markets. In this case, prices on financial markets are mostly determined by discounting the expected future cash flows, which, according to the Efficient Market Hypothesis (EMH), should reflect all currently available information about fundamentals. Under these circumstances, financial

markets develop their own speculative growth dynamics. These dynamics may be guided by irrational behavior as in the words of Keynes, "intelligence is devoted to anticipate what average opinion expects the average opinion to be". This development is supposed to harm the economy as the economy is in danger of becoming a by-product of a casino.

The "short termism" hypothesis

Financial markets attract short-horizon speculative traders as these markets allow for sequential trading. Prices react swiftly to information changes on financial markets. Prices are highly volatile thus allowing for profits (also losses) within very short time periods. Managers also take the short horizon of financial markets as their guideline for decision making because the financial market only put a premium on short term success. If financial markets undervalue firms, by undervaluing their financial instruments, it may harm the long run prospects of the company.

The "financial instability hypothesis"

The hypothesis goes back to the work of Minsky in the 1950s. Minsky, as cited by Binswanger (1999 p.78) discovered that the basic source of financial instability is the disproportionate development between real profit opportunities and debt commitment. During economic booms, as full employment is approached, debt commitment starts to outstrip the income flow necessary to service them. This is so because expectations become to euphoric in terms of real

profit opportunities, which are constrained by productivity growth, while the extension of credit is not. Credits are increasingly used for speculative and compensatory spending and not for real investment financing. The financial structure becomes increasingly fragile and the business cycle culminates in a debt deflation that induces a downturn. This was the scenario in the USA economy when speculative spending dominated productive spending at unprecedented levels, which systemic risk of the whole financial system leading to the financial crisis, a precipitate of the economic crisis of 2007.

Binswanger (1999) noted that the above financial hypothesis tends to establish a negative correlation between financial sector developments and real economic growth. The positive impact of financial activities is not sidelined under "normal" economic conditions that characterised the development during the 1950s and 1960s, but according to the afore mentioned work, it is overshadowed by negative impacts since the beginning of the 1980s. Whether financial market activities affect the real sector positively or negatively remains largely a matter of concern to this work.

Keynes was more concerned about speculative activities on the financial markets as they exert a malign influence on the prospects for channeling resources towards "a steady stream of enterprise" (Keynes, 1936, p.376). The Keynesians argued that there may be a negative correlation between financial sector activities and real sector growth in time of high speculative activities as speculation has the potential to crowd out enterprise. It therefore follows that the financial activities

do not necessarily enhance real productivity and financial sector may grow at the expense of the real sector.

Stock prices and investment

The relationship between stock prices and investment spending is based on the q theory of Tobin (1969), where q is the ratio of total market value of firms to the replacement cost of their existing capital stock at current prices. According to the theory, the firms would increase their capital stocks if q is greater than one, implying that the market value of firms is expected to rise by more than the cost of additional physical capital. Thus an increase in stock prices will result in an increase in the market value of firms, implying that firms would increase their capital stocks reflecting an increase in investment spending. Another link, though less direct, between stock prices and investment spending is based on the neoclassical model or cost-of-capital model. The model assumes that firms first determine the desired stock of real capital on the basis of prices of labour, capital, and expected sales and then determine the rate of investment depending on how fast they wish to reach the desired capital stock in the face of significant adjustment cost. Thus, the expected changes in sales and planned output are the major factors affecting investments. However, as noted by Bosworth (1975), if higher earnings are implied by higher expected output that increases stock prices, then the market valuation model implicitly accounts for the effect of expected output.

Stock prices and consumption

The relationship between stock prices and consumption expenditures is based on the life cycle theory, developed by Ando and Modigliani (1963), which states that individuals base their consumption decision on their expected lifetime wealth. Part of their wealth may be held in the form of stocks linking stock price changes to changes in consumption expenditure. Thus, an increase in stock prices will increase the expected wealth, which, in turn, will increase the consumption expenditures, suggesting the direction of causality from stock prices to consumption expenditures. On the other hand, an increase in consumption expenditures may result in an increase in the corporate sector's earnings, which will result in higher stock prices, implying causality from consumption expenditures to stock prices.

Stock prices and level of money supply

The monetary policy stance is transmitted into the real economy by various channels such as Asset Price Channel, Interest Rate Channel, Exchange Rate Channel and Credit Channel. All of these channels indeed affect stock prices directly or indirectly. Tobin (1969), quoted in Mishkin (2004 p. 84) hypothesised that monetary policy can affect the real economy through asset price channel. Expansionary monetary policy increases household's spending capacity which, in part, is spent in stock market, increases the demand for stocks and raises the stock prices. Tobin argued that if the market value of a firm's capital exceeds the cost of acquiring it, the firm increases its capital stock. On the other hand, contractionary

monetary policy lowers the present value of future earning flows and hence depresses stock markets.

The traditional Keynesian view of transmission channel is that monetary expansion leads to a fall in real interest rate, lowers firm's cost of capital and encourages higher investment spending through borrowing. In fact, when interest rates are very low, fixed interest securities provide very little competition for shares. A rational investor therefore, other things being equal, would like to pay a higher price for a share. A tightening of monetary policy reduces liquidity in the banking system, increases deposit and T-bill rates. This lowers the present value of future cash flows from stocks through discount factor and investors tend to readjust their investment portfolio. Capital market instruments such as equities experience far wider price fluctuations than money market instruments and are considered to be risky investments (Mishkin, 2004). It is therefore argued that if interest rates on bank deposit are relatively high, they can offer a stable, profitable alternative to the stock return. Rational investors would sell some stocks and invest in fixed income securities causing stock prices to fall sharply.

Credit view argues that monetary policy influences the financing cost of a firm as well as the availability of loans. If a credit channel is at work for firms that are quoted on stock markets, one would expect that expansionary monetary policy will enable them to take bank loan at easier terms and gain on bank lending rate. This interest differential gain will improve their balance sheets, make them more competitive and induce them to expand business activities. The burgeoning effect of these activities will be reflected through the stock price. Conversely,

contractionary monetary policy will affect the firms' share price in the opposite direction. Besides monetary policy, stock prices may be influenced by other factors. The firm-foundation theory argues that the market price of a share depends mostly on the growth rate of a firm's economic fundamentals such as dividends, earnings, interest rates and risk variables. In a top-down approach, economy's outlook, future sales and earnings of the industry are taken into account to estimate firm-specific return on stocks. Expectation of enrichment of economic fundamentals of a firm is reflected through higher price of stock.

Empirical literature

Various models have been used to explain the long-run relationship and short-run dynamic interactions between stock prices and macroeconomic variables that represent real economic activity. Arbitrage pricing theory (APT) put forward by Ross (1976) is the well-known model that explains the expected returns of stock prices. APT is simply augmented version of capital asset pricing model (CAPM) which has only one explanatory variable, market premium. APT measures the return of a financial asset by considering its sensitivity to more than one macroeconomic variable. Besides its theoretical advantages, it is a model that hardly captures significant empirical evidence because of the unobservable structures of factors that determine stock returns.

The relationship between the stock market returns and the macroeconomic variables are mostly documented for developed countries. One paper analyzing the determinants of the stock market returns is presented by Chen, Roll and Ross

(1986). Their paper examines the relationship between the market returns and macroeconomic factors with a different methodology that based on pricing the systematic macroeconomic risks. They found strong relationship between the market returns and the macro variables like industrial production, changes in the risk premium and the expected and unexpected inflation in United States. Nevertheless, their theoretical assumptions are far away from proposing a model consisting of all factors. Poon and Taylor (1991) argue that results of Chen et al. (1986) are spurious and they suggested using ARIMA models to overcome this serious problem.

Nelson (1976), Jaffe & Mandelker (1976) and Fama & Schwert (1977) also analyzed the relationship between macroeconomic factors and stock returns in United States during the period 1953-1974 and conclude that macroeconomic variables influence stock returns. Fama (1981) states that there is evidence that real stock returns are positively related to the measures of real activity like capital expenditures. He also mentioned that the inflation and money supply affects the stock market returns negatively. This finding is also reported in Bodie (1976), Geske & Roll (1983) and Pearce & Roley (1983, 1985). Fischer & Merton (1984), Barro (1990), Domian & Louton (1997) and Foresti (2006) confirmed a strong relationship between stock market performance and the real economic activity in United States. Moreover, Fama (1990), Schwert (1990) and Canova & De Nicolo (1995) all used causality tests and drew a common conclusion: an increase in stock market returns cause an increase in real economic activity.

The results of the studies for other countries are consistent with the findings of the papers, discussed earlier, focusing on the United States. Hamao (1988) applies an empirical investigation of the APT in the Japanese equity market and the results support the findings of Chen et al. (1986). Mukherjee and Naka (1995) found cointegration between Japanese stock market and macroeconomic indicators by applying Johansen cointegration test in the Vector Error Correction Model (VECM). Cheung & Ng (1998), Choi, Hauser & Kopecky (1999), Doong (2001) and Hassapis & Kalyvitis (2002) have a consensus that there is a strong relationship between stock market performance and the real economic activity in various industrialised countries. In addition Mao and Wu (2007) concluded that generally there is bidirectional long-run Granger causality between stock market prices and real economic activity in Australia.

There are also some papers that find no empirical evidence that the macroeconomic factors affect the stock returns. Poon & Taylor (1991) in United Kingdom and Gjerde & Saettem (1999) in Norway found that macroeconomic variables do not appear to affect share returns. Binswanger (2000), who used monthly data during the period 1953-1995, also states that the price movements since early 1980's cannot be explained by fundamental factors implying that the link between stock prices and real economic activity has broken down in U.S. and G-7 countries.

Mohiuddin, Didarul and Abdullah (2008) in the study of the relationship between macroeconomic variables and stock prices using OLS in Dhaka

(Bangladesh) found no significant relationship between macroeconomic variables and stock prices.

The increasing importance of the emerging economies led the researchers to concentrate on these countries. Cointegration test results of several papers on emerging markets show that stock market is cointegrated with a set of macroeconomic variables except Fung and Lie (1990) who found the existence of weak relationship between stock market index and changes in domestic production and money supply for Korea. Kwon and Shin (1999) stated that Korean stock market is cointegrated with a set of macroeconomic variables namely the production index, exchange rate, trade balance, and money supply. However, according to Granger Causality test, the Korean stock index does not Granger-cause economic variables. Maysami and Koh (2000) used Johansen cointegration test in the VECM and reported that Singapore stock market is interest and exchange rate sensitive. Brahmasrene and Jiranyakul (2007) employed Johansen-Jesulius (JJ) cointegration test and Granger-Causality test by using monthly data and concluded that the Thailand stock market index is related to industrial production index, money supply, nominal exchange rate, and international oil prices in the long run.

Kaplan (2008) analyzed the relationship between stock market index and GDP. He conducted Granger- Causality test and results show that stock market return granger-cause GDP, but not vice versa and he also suggested that stock prices can be used to predict the real economic activity. Aydemir and Demirhan (2009) investigated the co-movement between interest rates and stock market by

using Toda-Yamamoto (TY) method, which can be employed when the variables interested are not integrated at same order. According to causality results from TY procedure, there is a bidirectional causal relationship between exchange rate and all stock market indices.

Other authors conducted comprehensive researches into the linkage of stock prices and macroeconomic factors. These authors include Muradoglu, Taskin, and Bigan (2000), Diacogiannis, Tsiritakis, and Manolas (2001), Wongbangpo and Sharma (2002), and Mukhopadhyay and Sarkar (2003). Muradoglu et al. (2000) investigated possible causality between 19 emerging market returns and exchange rates, interest rates, inflation, and industrial production from 1976 to 1997. Their results revealed that the relationship between stock returns and macroeconomic variables were mainly due to the relative size of the respective stock market and their integration with world markets. In their study of the Greek stock market between 1980 and 1992 and its relationship to 18 macroeconomic variables, Diacogiannis et al. (2001) found significant high loadings between stock returns and 13 of the 19 macroeconomic variables for both periods, 1980-1986 and 1986-1992. Wongbangpo and Sharma (2002) explored the relationship between the stock returns for the ASEAN-5 countries of Indonesia, Malaysia, the Philippines, Singapore, and Thailand and five macroeconomic variables. By observing both short and long run relationships between respective stock indexes and the macroeconomic variables of gross national product (GNP), the consumer price index (CPI), the money supply, the interest rate, and exchange rate they found that in the long-run all five stock price

indexes were positively related to growth in output and negatively to the aggregate price level. But a negative long-run relationship between stock prices and interest rates was noted for the Philippines, Singapore, and Thailand, and was found to be positive for Indonesia and Malaysia. In the end, causality tests detected an overall relationship between macroeconomic variables and stock prices for all five ASEAN equity markets. Lastly, Mukhopadhyay and Sarkar (2003) conducted a systematic analysis of the Indian stock market returns prior to and after market liberalization and the influence of macroeconomic factors on returns. Specifically for the post-liberalization period (since 1995), real economic activity, inflation, money supply growth, FDI, and the NASDAQ-index were significant in explaining variations in Indian stock return. Nominal exchange rate, while significant during the pre-liberalization period (1989-1995), was found to not be significant after liberalization

Nishat (2004) evaluates long term association among macroeconomic variables, stock prices and employed money supply, CPI, IPI, and foreign exchange rate as explanatory variable. The result shows that there are causal relationships among the stock price and macroeconomics variables. The data used in this study ranged from 1974 to 2004. Most of the time series data is nonstationary therefore unit root technique is used to the make data stationary. The result also indicates that industrial production is significantly affects to macroeconomic variables. Nishat (2004) used Karachi stock exchange 100 index price from 1974 to 2004. Grange causality test is used to find the correlation

among the variables and the result of granger causality shows that interest rate is not granger cause by stock price.

Ahmed (1999) empirically investigated on SENSEX index price affects due to real and financial sector performance in Indian economy, the data has been chosen from the period 1997 to 2007. The study consists of variables such as export and foreign exchange rate and foreign direct investment. Granger causality test is used to find out the causal relationship between the variables. All the variables are Granger cause by stock prices. Speculation in the market was analyzed with the help of AR (Auto Regressive) which was highly significant according to the result.

Husain and Mahmood (2001) used variables such as investment, GDP and consumption employing granger causality test to define the relationship among the selected variables and stock prices, finding shows at two lags of all variables are highly significant in effecting on stock prices.

Shahid (2008) explores causal relationships among equity prices and industrial production, money supply, exports, exchange rate, foreign direct investment and interest rates for the period 3/95 to 3/2007 by employing cointegration analysis and Toda and Yamamoto Granger causality test on quarterly data. Short run relationships among variables have also been investigated by using Bivariate Vector Autoregressive Model for variance decomposition and impulse response functions. The study concludes that equity prices in India lead economic activity in general. However, Interest rate is found to lead the equity prices.

Gay (2008) evaluated the association among stock prices and macroeconomics variables in cases of China, India, Brazil and Russia which are emerging economies of the world using Oil price, exchange rate, and moving average lags values as explanatory variables employing MA (Moving Average) method with OLS (Ordinary Least Square) and found insignificant results which postulate inefficiency in market. Finally the study concluded that in emerging economies the domestic factors influence more than external factors i.e. exchange rate and oil prices.

Aftab (2000) examines the association between monetary and fiscal policy of Pakistan to equities market and the result of his analysis is significant. The result shows that fiscal and monetary policy could change market capitalization by changing liquidity and volume of equity trade which can significantly affect the market capitalization and stock prices in case of Pakistan from the period 1993 to 1998.

Liaquat and Ahmed (2008) used data from 1971 to 2006 and try to find out the relationship of economic growth with stock market prices and the study shows that there are dynamics association between stock prices and economic growth employing DF-GLS test first time in case of Pakistan.

Shahbaz (2007) investigated the association between stock prices and rate of inflation using ARDL approach for dynamics analysis. The ARDL method is used when the variables involved are not cointegrated of the same order. Result of this study depicts that stock hedges are not in favor of inflation in long run as well as in short run and found that black economy affects long run and short run prices

of the stock. The study used variables CPI, (inflation) and share of black economy the sample size of the study is 1971-2006.

For Turkey case, Karamustafa and Kucukkale (2003) show that the relation between stock returns and industrial production is positive and the relation between stock returns and trade balance is negative. Furthermore, the findings of the study indicate that the ISE is neither the result variable nor the cause variable of any macroeconomic variable. The results of Yildirtan (2007) indicated that there is a linear relation between imports, exports and the stock returns. Kandir (2008) and Tursoy, Gunsel and Rjoub (2008) indicates that industrial production does not appear to have any significant affect on stock returns. According to the result of Kaplan (2008), the stock prices have a positive and statistically significant long-run effect on out level implying that stock prices lead real economic activity in Turkey. Furthermore, the direction of the causality between variables is only from stock market price to real economic activity.

Sharma and Ratanapakorn (2007) used interest rate, exchange rate and reserve, industrial production index, monetary growth and inflation as independent variables with AR and MA to nullify the effects of non stationary in the variables. The result shows that lags values are highly connected with current share prices which recommend the speculation in market. Exchange rate and reserve, industrial production index and monetary growth are significantly associated. The study took data set from 1986 to 2004.

Dimintova (2005) used multivariate model and try to find out link among stock prices, exchange rate and economics policy (fiscal and monetary policies).

The study defines the interest parity condition affects on stock prices. The result shows an effect of deprecation on stock prices.

Such studies in the contest of Africa and Ghana in particular are highly hard to come by. This claim is justified by Ushad et al, (2008) and Osinubi, (2004) when they stated that despite the relative increase in the migration of capital to these markets and the associated high returns, these markets have not been well studied.

In Ghana the most related study in this direction is one by Adams and Twenebouh (2008), where they studied the relationship between macroeconmic factors and stock market movenments. This study uses quarterly data from 1991 to 2006 in a long and short run dynamic model to establish the relationship between stock market index and macroeconomic variables. Employing the Johansen's multivariate cointegration test and innovation accounting techniques the study established that there is cointegration between macroeconomic variables and stock prices in Ghana indicating long-run relationship. Further tests indicate that, in the short-run, inflation and exchange rates matter for share price movements in Ghana, however, interest rate and inflation prove very significant in the long-run.

Another study quite related because it uses the index of the Ghana bourse in trying to establish a relationship between changes in the foreign exchange market and the GSE was conducted by Adjasi, Harvey and Agyapong (2008). Their study analysis the relationship between exchange rates and stock prices in trying to determine whether exchange rate (a macroeconomic variable) has any

effect on stock prices. In the framework of the Exponential Generalised Autoregressive Conditional Heteroskedascity (EGARCH) the study established that there is a negative relationship between exchange rate volatility and stock market returns – a depreciation in the local currency leads to an increase in stock market returns in the long run whereas in the short run it reduces stock market returns.

In General, most of the studies reviewed above concentrate on developed countries (Fama, 1990; Ferson & Harvey, 1993; Cheung & Ng, 1998; Mauro, 2003; Liu & Sinclair, 2008; Shahbaz, Ahmed & Ali, 2008) and the few on developing countries did not really capture the African case. Thus there is the need to deepen the knowledge of the relationship between stock prices and the real sector in the African context.

Two studies are very important to the current study in that they are the pioneering works in the direction that the study wishes to explore. The current study is very similar to Adam and Tweneboah (2008) in that both studies concentrate on macroeconomic variables and stock prices. The difference therein is the key variables employed in this current study. Whereas Adam and Tueneboah (2008) used a host of variable including GDP, the current study first of all decomposes the real GDP into real consumption share, real investment share and government share in order to analyze the relationship these variables have with stock prices following the claims in the theoretical literature. Further the study does these analyses in the bearing in mind the simultaneity that could

characterize the relationship between the selected variables whereas the earlier study used only a single equation.

The study by Adjasi, Harvey and Agyapong (2008) is also quite crucial to this study in that, despite using the Ghana bourse as a case, it also studied the relationship that the bourse price indicator have with another macroeconomic variable, representing the external sector.

Conclusion

A brief outline between the relationship between stock prices and macroeconomic variables is relevant at this stage. The Keynesians believe largely that there may be a negative correlation between stock market activities and the real sector in time of high speculative activities as speculation has the potential of crowding out enterprise. Financial activities do not necessarily enhance real sector productivity and may grow at the expense of real sector. From the new classical perspective, a positive correlation between financial sector activities and real sector will not be surprising.

This study is going to adopt quite different technique in exploiting this interrelationship since earlier method were formulating a single equations in the framework of APT developed by Ross (1976) to justify the use of macroeconomic variables in the prediction of stock prices. But later studies in this direction try to recognize the endogeniety that can characterize this relationship thus this study formulates a dynamic equation to capture this relationship in the need to examine both.

CHAPTER THREE

METHODOLOGY

Introduction

The aim of this chapter is to develop and specify an empirical model that captures the interrelationship between stock prices and macroeconomic variables with emphasis on the real sector.

Theoretical model

The theoretical models that examine the interrelationship between macroeconomic variables, with particular reference to the real sector, and stock price indeces can be found in the works of Foster (2005) and Keran (1971). Foster (2005) examines the theoretical link that traces changes in stock prices to real GDP via the effect of changes in stock prices on real consumption and investment expenditure. Keran (1971) examines the effects of changes in macroeconomic variables on stock prices.

Link from stock index movements to macroeconomic variables

Analysing the effect of changes in stock prices to changes in the real sector is done largely in the framework of the work done by Foster (2005) which is captured by Figure 2. In theory, stock price movements may have direct effects

on private investment and consumption via three main channels: the q-channel on private investment, the balance sheet-channel, and the consumption-wealth-channel.

From Figure 2, the first channel through which stock price movements may have a direct impact on private investment is the q-channel - an approach initially developed by Tobin in collaboration with Brainard (as cited in Buiter, 2004 p.18) which has dominated much of the empirical investment literature over the past decades. Tobin argued that the ratio of the stock price to the replacement cost of capital, a statistic which has become known as Tobin's q, should be considered as a good indicator of a company's incentive to invest, and that, moreover, this variable is the only relevant determinant for a company's investment. If Tobin's q is greater than one, then capital is more valuable if ploughed back into the operations of the company, and the (increase in the) company's market value is greater than it costs to produce it. As rising stock prices directly result in an increase in Tobin's q, it would be profitable for the company to expand its capital stock, leading to an increase in investment spending, aggregate demand and aggregate output.

A second channel through which stock price movements may influence investment decisions - not only of listed companies, but of all companies holding stocks - is the balance sheet-channel evidenced from Figure 2. Because of asymmetric information in credit markets, the ability of companies to borrow depends, among other factors, on the value of collateral they can provide.

As stock prices increase, the value of collateral of companies holding stocks increases, enhancing their access to external funds for investment. Particularly in the case of declining stock prices, important "second-round effects" on the financing capacities of companies may occur: Declining stock prices leading to a decrease in investment demand in the first place, may be accompanied by a general deterioration of aggregate demand and overall economic conditions. With profits and cash flows falling as a result thereof, a company's ability to finance investment spending by internal funds may worsen as well, starting a self-enhancing process, which has also been called "financial accelerator" (Bernanke, Gertler & Simon, 1996; Kiyotaki & Moore, 1997).

In addition to the balance sheet-channel affecting a company's investment decisions, changes in net wealth caused by movements in stock prices can also have an effect on both the lending behavior of banks and the consumption of private households. With stock prices falling and the resulting impairments being recorded on the asset side of banks' balance sheets, banks' equity might fall to such a low level that the bank might be forced to reduce lending because of regulatory capital requirements and the increased cost of issuing new equity.

Similarly, with regard to private households, balance sheet effects might on the one hand result in reduced consumption, if falling stock prices reduce the value of collateral and thereby worsen households' ability to raise additional loans. On the other hand, the deterioration in the households' balance sheet is also associated with a decline in liquidity, potentially leading consumers to fear for

their solvency and, as a result, to postpone irreversible purchases of durable goods and housing.

Regarding the effects of stock price fluctuations on private consumption, for households holding stocks, a permanent increase in stock prices implies an increase in financial wealth. Assuming that consumers aim at smoothing their consumption over time, the increase in financial wealth results in higher current and future consumption, stimulating aggregate demand and output.

The increased importance of shares as an investment tool has raised the potential of the occurrence of corresponding wealth effects to occur, and stimulated much of the international research on possible effects of stock price movements on macroeconomic developments. If households holding stock do not only fund consumption out of current disposable income but also out of financial wealth, the consumption-wealth effect may become an important transmission channel.

Theoretically, the relationship between wealth and consumption can either be based on the life-cycle model (Brumberg & Modigliani, 1979; Ando & Modigliani 1963) or the permanent income hypothesis (Friedman, 1957), both of which imply a linear relationship between aggregate consumption, (labour) income and financial wealth. As consumers are assumed to smoothen their consumption over time, both theories imply that permanent increases in stock prices associated with an increase in financial wealth will lead to higher current and future consumption. The Fig. 2 conceptually captures the transmission

mechanism form stock price movement to the developments in the real sector of an economy.

Besides these three channels through which stock price movements directly affect the investment and consumption demand of companies and consumers having access to equity finance or holding stocks, stock prices may also affect investments indirectly via confidence effects. Stock prices are often used as leading indicators of cyclical developments and may therefore also influence consumption and investment decisions albeit not causing them. A decline in stock prices may, for example, be interpreted as a signal for increased downward risks to future economic activity and employment. This may hurt consumer confidence and current aggregate consumption of households - even if these do not own stock. Likewise, a general decline in stock prices may also lead companies (irrespective of being able to issue new equity in the stock market) to lower their profit expectations and curtail investment plans.

In addition to these transmission channels via which stock price movements impact on the macroeconomic development, the repercussions of stock market movements on the economies of other countries are also relevant due to the economy's exposure owing to companies' international capital and trading links.

Besides effects on foreign demand, the state of the foreign equity markets also plays a role for the above-mentioned transmission mechanisms to be effective. Retail and institutional investors are increasingly holding foreign equities and domestic companies may even be quoted on foreign stock exchanges.

Changes in foreign stock prices are therefore associated with changes in financial wealth of domestic companies and consumers, or with changes in the market value of capital, possibly affecting domestic demand via the consumer-wealth and the balance sheet-channel or (in case of a foreign listing) the q-channel.

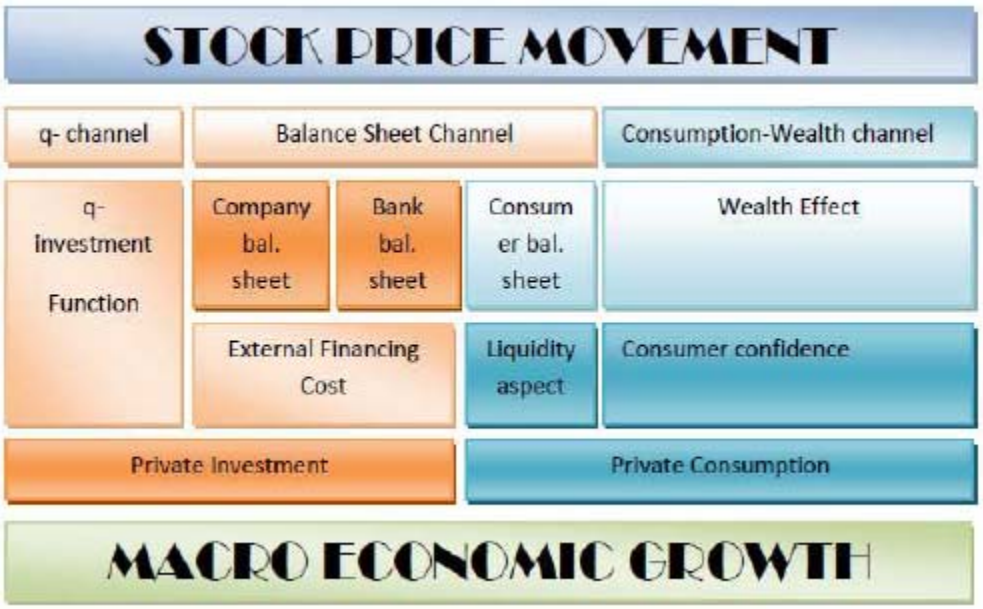

Figure 2: Effects of Stock Prices on Macroeconomic Growth

Source: Foster, 2005

Link from macroeconomic variables to stock index movements

The effect of changes in macroeconomic variables on stock prices is done largely in the framework of the work done by Keran (1971). Keran (1971) postulates that the policy variables of government spending (G) and money supply (M) affect stock prices through two channels which are depicted in Figure 3.

Firstly, the exogenous variables affect total spending (Y) which in combination with corporate tax rate (t_c) affects corporate earnings and this causes investors to change their expectations of corporate earnings. Share prices then respond, with high earnings expectations leading to share price increases and vice versa.

Secondly, the policy variables affect total spending which in combination with the economy's potential output (Y*) and past changes in price determine current changes in prices (P). If actual GDP rises and stays above potential output, then inflation tends to increase. This is because of the limited supply of workers, capital equipment and natural resources, along with the limits of technology and management skills. Y* and P then determine current changes in real output (X). Changes in X and P generates expectations about inflation and real growth which turns to affect interest rates. Interest rates have negative effect on share prices. As taxes rise, investors raise the required rates of return, causing share prices to fall. The diagram below captures the impact of macroeconomic variables on stock prices as discussed above:

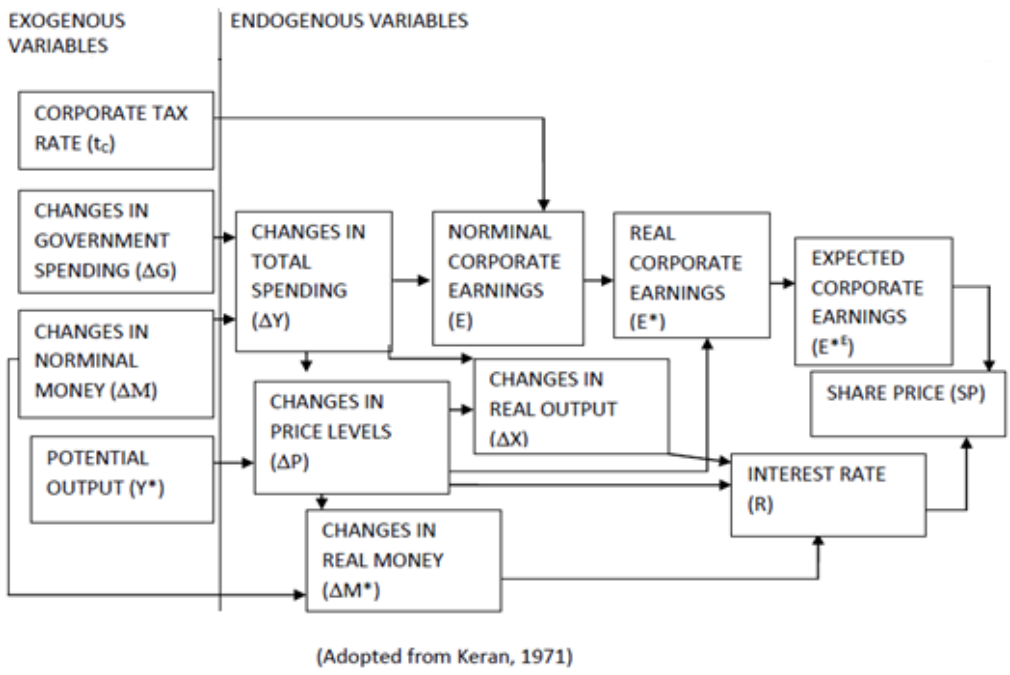

Figure 3: Effect of macroeconomic variables on share prices

Source: Keran, 1971

Empirical model

In line with the objectives of the study and the literature reviewed thus far, the functional form of the equation the study estimates is stated as:

$$lnRGDP = f(ASI, lnRC, lnRI, lnRG, lnM2, CT) \quad (1)$$

The study estimates equation (1) in a dynamic model with lnRGDP, ASI, lnRC and lnRI being endogenous variables with lnM2, lnRG and CT being exogenous variables. Where ln denotes logarithm, RGDP is Real Gross Domestic Product, ASI is All- Shares Index, RC is the Consumption share of real GDP, RI is Investment share of real GDP, RG is government share of real GDP, M2 is level of money supply CT is corporate tax rate. Consistent with Asteriou & Price

(2007), the study takes the logarithm of RGDP, RI, RC, RG and M2 in order to linearise exponential trends since the log function is the inverse of an exponential function.

Data selection justification

In this section, the study justifies the selection of the variables included in the estimated models.

GSE All-Shares Index (ASI)

This variable represents the performance of the Ghana stock exchange and it is one of the key variables in this analysis. Its selection is based on the fact that theory has it that a well functioning exchange promotes growth in investment and consumption thereby increasing economic growth. Also the performance of this index serves as a key guide to investor and consumers as to how to spend money (Forster, 2005; Levine & Zervos, 1996; Eschenbach & Schunkecht 2004).

Real GDP (RGDP)

The real GDP is used in this analysis as a measure of real sector activities. Forster, 2005 stated that a well performing stock exchange, increase the performance of the real sector and Keran, 1971 also stated that the interplay between potential GDP and price level determine the level of stock price and hence stock market performances.

Consumption Share of Real GDP (RC)

On the exposition by Forster, 2005 that share prices affect economic growth via the consumption channel, the study includes this variable into the model with the view of finding out the interrelationship between consumption expenditure and share prices.

Investment Share of Real GDP (RI)

The inclusion of real investment expenditure into the model was motivated by the fact that via the investment channel, share prices affect economic growth and the real sector (Forster, 2005). Investment depends on the level of share prices (Tobin, 1969) by investors taking into account the ratio known as "Tobin's Q". Also, as GDP is known to affect share prices (Keran, 1971), it is eminent that investment as a key component of GDP may affect share prices thus the study seeks to find out the relationship in both directions.

Government Share of Real GDP (RG)

This variable enters the model as a policy variable and also to complete the components of the GDP. Keran, 1971 stated that changes in government spending affects total spending, corporate earnings and thereby affecting share prices.

Level of Money Supply (M2)

The level of money supply is another policy variable. Since changes in nominal money supply affects total spending and consequently affecting corporate earning leading to changes in share prices (Keran, 1971).

Corporate Tax Rate

The corporate tax rate is included in the analysis as one of the policy variables. In the view of Keran, 1971, changes in corporate tax rates affect nominal and real corporate earning and thereby affecting share prices.

Data type and source

The study made use of quarterly data for ASI, RGDP, RC, RI, RG, CT and M2 from 1991:1 to 2006:4. The data on ASI was obtained from the Ghana Stock Exchange (GSE). RGDP, RC, RI and RG were extracted from Penn World Tables 6.1 (PWT 6.1). The corporate tax rate was obtained from the Internal Revenue Service (IRS) and the level of money supply was extracted from World Development Indicators (WDI, 2010).

All the data series were obtained as annual variables and the Gandolfo (1981) algorithm was used to interpolate quarterly series. A brief description of the variables is presented in Table 1.

Table 1: Description of variables and sources of data

Variable	Concept	Description	Source	Unit
LASI	Log of GSE-All shares Index	GSE-All Shares Index	Ghana Stock Exchange	Nov 1990= 70.08
LRGDP	Log of Real Gross Domestic Product	Gross Domestic Product at PPP	PWT 6.1	Constant Prices (PPP)
LRC	Log of Real Consumption	Consumption Share of Real GDP	PWT 6.1	Constant Prices (PPP)
LRI	Log of Real Investment	Investment Share of Real GDP	PWT 6.1	Constant Prices (PPP)
LRG	Log Government Spending	Government Share of Real GDP	PWT 6.1	Constant Prices (PPP)
LCT	Log of Corporate Tax Rate	Corporate Tax Rate	IRS	Percentage (%)
LM2	Log of money Supply	Broad Money (M2)	WDI, 2010	Current Local Currency

Source: Compiled by author, 2011

Estimation techniques

In order to ascertain the direction of interrelationship between stock price index and macroeconomic variables, the study applied the granger causality test in the framework of VECM. The procedures followed are:

- The study employ the Augmented Dickey-Fuller (ADF) test to verify the time series properties of the data and the Phillip-Perron (PP) test will be used to confirm the estimates of the ADF test. The order of integration of the variables will be ascertained through the unit root test.
- In the second step, the study tested for cointegration in the bid to verify the existence or otherwise of long run co-movement between the variables using Johansen's multivariate approach.
- In the third stage, the study checks how the key variables respond to exogenous shocks using the variance decomposition analysis.
- In the final step, we employed granger-causality to test for causality. Our causality test is preceded by cointegration testing since the presence of cointegrated relationships have implications for the way in which causality testing is carried out.

Unit root tests

A time series is stationary if its mean, variance and autocovariances are independent of time but due to the data generating process, time series data is rarely stationary. A spurious regression is encountered when a non stationary series is used in regression. Spurious regression occurs when the regression

results reveal a high and significant relationship among variables when in fact none exist. Further, Stock and Watson (1988) noted that the usual test statistics will not possess standard distributions if some of the variables in the model have unit roots.

The ADF and PP unit root tests were employed in order to ensure reliable results of the test for stationarity due the weaknesses in each method. These tests are similar except that they differ with respect to the way they correct for autocorrelation in the residuals. The null hypothesis to be tested is that the variable under investigation has a unit root (is not stationary). In each case, the lag-length is chosen using the Akaike Information Criteria (AIC) and Swartz Information Criterion (SIC) for both the ADF and PP test but priority was given to AIC since Adam and Tweneboah, (2008) maintains that the SIC has the tendency of underestimating the lag order. The sensitivity of ADF tests to lag selection renders the PP test an important additional tool for making inferences about unit roots. The basic formulation of the ADF is specified as follows:

$$\Delta X_t = \alpha + \delta t + \rho X_{t-1} + \sum_{i-1}^{p} \lambda_i \Delta X_{t-1} + \varepsilon_t \qquad (2)$$

Where X_t denotes the series at time t, Δ is the first difference operator, α , δ , β , λ are parameters to be estimated and ε is the stochastic random disturbance term. Thus, the ADF and the PP test the null hypothesis that a series contains unit (non-stationary) against the alternative hypothesis of no unit root (stationary). That is:

$H_0: \rho = 0$

$H_0: \rho \neq 0$

If the tau value or t-statistic is more negative than the critical values, we reject the null hypothesis and conclude that the series is stationary. On the other hand, if the tau statistic is less negative than the critical values, we fail to reject the null hypothesis and conclude that the series is non-stationary.

Johansen multivariate approach to cointegration

Econometric literature has abundant econometric techniques to investigate cointegration relationships among macroeconomic variables. With regards to uni-variate co-integration technique, there are several examples including Engle-Granger (1987) and FMOLS procedures of Phillips and Hansen (1990). Many examples of multivariate co-integration technique of Johansen (1988), Johansen & Juselius (1990), and Johansen (1995) have provided full information for the maximum likelihood co-integration approach and the newly proposed autoregressive distributed lag (ARDL) approach (Pesaran & Shin, 1999; Pesaran, Shin & Smith, 1996, 2001).

Johansen (1988) and Johansen & Juselius (1990) particularly developed multivariate method that explicitly use the vector autoregressive (VAR) and the vector error correction (VECM) framework for the testing the presence of cointegration and estimation of long-run relationships among nonstationary macroeconomic time series. The VAR and VECM provide a useful framework to study the impact of unanticipated shocks (individual and system) on the endogenous variables (impulse response functions). Additionally, we can identify the relative importance of each variable in explaining the variations of

endogenous variables (variance decomposition analysis). Moreover, both long-run (cointegration) relationships and short-run dynamics of the variables in the system can be established. The relationship between VAR and VECM is expressed as follows. We represent the system by unrestricted reduced form VAR(p):

$$X_t = \mu + \theta_1 X_{t-1} + \cdots + \theta_k X_{t-k} + v_t, \qquad t= 1, 2,..., n \qquad (3)$$

Where X_t is an 4 x1 vector of integrated series of order one (economic growth, capital formation, financial deepening and interest rate), μ is a vector of intercepts while ν_t is a vector of error terms and *k* represents the lag length of the series. It is important to note that a VAR does not contain explanatory variables. Estimation of equation 5 requires that $\nu_t \sim ID(0,\Omega)$ where Ω is a non-diagonal covariance matrix that remains constant overtime. Following Johansen (1991) and provided that the variables are integrated of order one and cointegrated, further assuming Δ represent the first differences, equation 5 is transformed into an equilibrium error correction model of the form:

$$\Delta X_t = \mu + \Gamma_1 X_{t-1} + \Gamma_2 X_{t-2} + \cdots + \Gamma_{p-1} X_{t-p+1} + \Pi X_{t-1} + \varepsilon_t \qquad (4)$$

Where $\Gamma_1 = -(\theta_{i+1} + \cdots + \theta_k)$, I =1 …k-1 and $\Pi_i = -(I - \theta_1 - \cdots - \theta_k)$

Γ_i represent a 4 x 4 matrices of coefficients of the first difference variables that capture the short-run dynamics. The coefficients of the lagged dependent variable indicate inertia as well as the formation of expectations. The coefficients of the other lagged endogenous variables provide estimates impact assessment. The coefficient matrix Π contains information about the long-run relationships among

the variables involved in the model. Given that the rank of Π is $0< r < n$, then it can be decomposed into $\Pi=\alpha\beta$ and the error correction representation of equation 4 can be formulated as:

$$\Delta X_t = \mu + \Gamma_1 X_{t-1} + \Gamma_2 X_{t-2} + \cdots + \Gamma_{p-1} X_{t-p+1} + \Pi X_{t-1} + \alpha(\beta' X_{t-p}) + \varepsilon_t \quad (5)$$

Where the columns of β are interpreted as distinct cointegration vectors providing the long run relationships $(\beta' X_t)$ among the variables, and the α's are the adjustment or error correction coefficients (loading matrix) indicating the adjustment to long-run equilibrium. One major problem in the estimation of VAR and VEC models is the selection of an appropriate lag length. Most researchers have selected lag lengths in an arbitrary way. The lag length plays a crucial role in diagnostic tests as well as in the estimation of VECM and VAR models (Bhasin, 2004). As a result, appropriate lag length (p) will be chosen using standard model selection criteria (AIC and SBC) that ensure normally distributed white noise errors with no serial correlation.

Johansen (1988) cointegration techniques allow us to test and determine the number of cointegrating relationships between the non-stationary variables in the system using a maximum likelihood procedure. In making inferences about the number of cointegrating relations, Johansen (1988, 1991) and Johansen & Juselius (1990) proposed the use of two test statistic: the trace statistic and the maximum Eigen value statistic. The trace statistic is determined using the following formula:

$$\lambda_{trace} = -T \sum_{i-r+1}^{n} \log(1 - \lambda_i) \qquad r = 0, 1, 2, \ldots, n-1 \quad (6)$$

T = number of observations

λ_i = is the i^{th} Eigen value.

The maximum Eigen value statistic is determined using the following formula:

$$\lambda_{max} = -Tlog(1 - \lambda_{r+1}) \quad \text{r = 0,1,2, …, n-2, n-1} \qquad (7)$$

The trace and maximum Eigen value statistics are compared with the critical values tabulated in Osterwald-Lenum (1992).

Granger causality test

The study of causal relationships among economic variables has been one of the main objectives of empirical econometrics. According to Engle & Granger (1987), cointegrated variables must have an error correction representation. One of the implications of Granger representation theorem is that if nonstationary series are cointegrated, then one of the series must granger cause the other (Gujarati, 2001). To examine the direction of causality in the presence of cointegrating vectors, Granger causality is conducted based on the following:

$$\Delta Y_t = \mu_0 + \sum_{i-1}^{p} \beta_{1i} \Delta Y_{t-i} + \sum_{i-0}^{p} \emptyset_{1i} \Delta X_{t-i} + \xi_{1i} ECT_{t-1} + \nu_t \qquad (8)$$

$$\Delta X_t = \mu_0 + \sum_{i-1}^{p} \beta_{2i} \Delta X_{t-i} + \sum_{i-0}^{p} \emptyset_{2i} \Delta X_{t-i} + \xi_{2i} ECT_{t-1} + \upsilon_t \qquad (9)$$

Where ΔY and ΔX are our nonstationary dependent and independent variables, ECT is the error correction term, ξ_{1i} and ξ_{2i} are the speed of adjustments. p is the optimal lag order while the subscripts *t* and *t-i* denote the current and lagged values. If the series are not cointegrated, the error correction terms will not appear in equations 8 and 9. To find out whether the independent variable (*X*) granger-causes the dependent variable (*Y*) in equation 8, we examine the joint significance of the lagged dynamic terms by testing the null hypothesis:

$H_0 : \phi_{1i} = 0$, implying that the independent variable (*X*) do not granger-cause the dependent variable (*Y*), against the alterative hypothesis that

$H_0 : \phi_{1i} \neq 0$, implying that the independent variable (*X*) granger-cause the dependent variable(*Y*).

Similarly, to find out whether the independent variables (*Y*) granger-cause the dependent variable(*X*) in equation 9, we examine the significance of the lagged dynamic term by testing the null hypothesis

$H_0 : \phi_{2i} = 0$, implying that the independent variable (*Y*) do not granger-cause the dependent variable (*X*), against the alterative hypothesis that

$H_0 : \phi_{2i} \neq 0$, implying that the independent variable (*Y*) granger-cause the dependent variable (*X*).

Using the standard F-test or Wald statistic, four possibilities exist: First, rejection of the null hypothesis in equation 8 but failing to reject the null in equation 9 at the same time implies unidirectional causality running from *X* to *Y*. Second, a rejection of the null hypothesis in equation 9 but at the same time failing to reject the null in equation 8 implies unidirectional causality running from *Y* to *X*. Third, simultaneous rejection of the two null hypotheses indicates bi-directional causality. Fourth, simultaneous failure to reject the two null hypotheses indicates independence or no causality between the variables of interest.

Variance decomposition

The variance decomposition provides complementary information for a better understanding of the relationships between the variables of a VAR model. Enders (2004) contends that the variance decomposition tells us the proportion of the movements in a sequence due to its own shock, and other identified shocks. While impulse response functions trace the effects of a shock to one endogenous variable on to the other variables in the VAR, variance decomposition separates the variation in an endogenous variable into the component shocks to the VAR. Therefore variance decomposition provides information about the relative importance of each variable in explaining the variations in the endogenous variables in the VAR.

Data analysis

We employed both descriptive and quantitative analysis. Charts such as graphs and tables were employed to aid in the descriptive analysis. Unit root tests were carried out on all variables to ascertain their order of integration. Furthermore, the study adopted the multivariate Johansen's maximum likelihood econometric methodology for cointegration introduced and popularised by Johansen (1988), Johansen & Juselius (1990) and Johansen (1991) to obtain both the short and long run estimates of the main variables involved. All estimations were carried out using Econometric views (Eviews) 5.0 package.

Summary and conclusions

This chapter developed and presented the methodological framework suitable for conducting the study. The model was developed from the theoretical conceptions of Foster (2005) and Keran (1971). Quarterly time-series data on real GDP, consumption share of real GDP, investment share of real GDP, government share of real GDP, level of money supply, GSE All-shares index and corporate tax rate from 1991 to 2006 were employed for the study. Stationarity test was conducted using ADF and PP tests. Moreover, Johansen cointegration test, VAR, VECM were used to examine the long-run and short-run dynamics among the variables. Variance decomposition analysis was employed to determine the relative contributions of each endogenous variable to the forecast error variance of a targeted variable. Finally, the chapter used the Granger-causality technique to determine whether the direction of causality between the stock price index and these macroeconomic variables.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents the descriptive statistics of the variables and discusses the results of the estimation exercise.

Descriptive statistics

In this section, an analysis of the descriptive statistics is carried out. The issues looked at include the mean, median, maximum, minimum, standard deviation, skewness, kurtosis, Jarque-Bera, probability, sum, sum squared deviation and number of observation. Table 2 shows a summary of the descriptive statistics of the variables at levels.

From Table 2, the total number of observations used was 64 and it was found that all the variables have positive means. The study further observed that all the variables are positively skewed except the corporate tax rate (CT). This observation is not strange considering the fact that the corporate tax rate has been moving downwards during the period under consideration. Also, the probability values of the variables prior to transformation indicated that whereas the null hypothesis that ASI, CT, RC, RI, RGDP and M2 are normally distributed cannot

be rejected at 10% level of significance, we reject the null hypothesis that RG is normally distributed at all conventional levels.

Table 2: Descriptive statistics of variables prior to transformation

	ASI	CT	RC	RI	RGDP	RG	M2
Mean	416.7315	32.84375	28591.27	2464.346	6334790.	99904.46	1449643.
Median	194.6298	35.00000	27153.43	2260.435	6093363.	96161.22	1302646.
Maximum	1759.886	35.00000	42375.24	4767.185	9681824.	144048.6	3052855.
Minimum	12.90836	25.00000	23123.55	1710.151	4338706.	62956.14	553718.5
Std. Dev.	521.7397	3.503824	5399.124	746.6605	1509787.	20597.54	645325.8
Skewness	1.346672	-1.455967	1.161577	1.830148	0.516983	0.120891	0.637129
Kurtosis	3.352397	3.567868	3.392357	5.758583	2.019037	2.366098	2.318023
Jarque-Bera	19.67544	23.47154	14.80264	56.02013	5.416996	1.227442	5.570207
Probability	0.000053	0.000008	0.000610	0.000000	0.066637	0.541333	0.061723
Sum	26670.81	2102.000	1829841.	157718.1	4.05E+08	6393885.	92777159
Sum Sq.	17149377	773.4375	1.84E+09	35122624	1.44E+14	2.67E+10	2.62E+13
Observations	64	64	64	64	64	64	64

Source: Computed by author using Eviews 5.0

Table 3 shows the descriptive statistics of the variables after they have been transformed using logarithms.

Table 3: Descriptive statistics of transformed variables

Variables	LRI	LRC	LRGDP	LRG	LM2
Mean	7.773853	10.24504	15.63451	11.49034	14.08995
Median	7.723311	10.20922	15.62271	11.47377	14.07989
Maximum	8.469511	10.65432	16.08576	11.87791	14.93159
Minimum	7.444337	10.04861	15.28309	11.05019	13.22441
Std. Dev.	0.255771	0.174846	0.232753	0.212058	0.445673
Skewness	1.275312	0.897902	0.261922	-0.291814	0.055691
Kurtosis	4.133902	2.800847	1.807805	2.376483	1.956547
Jarque-Bera	20.77711	8.705527	4.521975	1.945050	2.936537
Probability	0.000031	0.012871	0.104247	0.378127	0.230324
Sum	497.5266	655.6827	1000.609	735.3815	901.7567
Sum Sq. Dev.	4.121375	1.925980	3.412968	2.833023	12.51333
Observations	64	64	64	64	64

Source: Computed by author using Eviews 5.0

In Table 3, the variables have been transformed by taking their logarithms in the bid to linearize them. Still maintaining the number of observations for each variable at 64, the study observed that all the variables are positive means and are positively skewed except LRG which has negative skewnesss. Whereas we reject the null that LM2 and LRG are normally distributed at 10% significant level we

cannot reject the null hypothesis of LRI, LRC and LRGDP being normally distributed at 10% significant level.

Correlation matrix

Table 4 give a snapshot of how the variables corralate with each other in a correlation matrix.

From the correlation matrix, the log of corporate taxes has a negative correlation with all variables except the log of the government expenditure. This is logical since it is expected that corporate taxes stifle investments by reducing the volume of plough back profit, reduces dividends and affects consumption negatively and consequently affect real GDP. The negative correlation observed between the real investment and government expenditure only stresses the fact that both compete for funds from the same source with investment emanating from saving and government expenditure emanating largely from public sector borrowing. It is expected that the All-Shares index will correlate positively with the other variables. From the fundamental analysis point of view stock prices derive their values from the economic fundamentals thus a growing GDP, investment, and consumption will lead to firms making positive returns which positively affect their assets and consequently affect the value investors place on the shares of these companies.

Table 4: Correlation matrix

	LRGDP	ASI	LRI	LRC	LRG	CT	LM2
LRGDP	1.000000	0.849321	0.758614	0.949428	0.296994	-0.823540	0.984292
ASI	0.849321	1.000000	0.781924	0.857715	0.165272	-0.890817	0.830379
LRI	0.758614	0.781924	1.000000	0.860598	-0.199579	-0.874691	0.710545
LRC	0.949428	0.857715	0.860598	1.000000	0.046426	-0.921409	0.925432
LRG	0.296994	0.165272	-0.199579	0.046426	1.000000	0.123414	0.375112
CT	-0.823540	-0.890817	-0.874691	-0.921409	0.123414	1.000000	-0.791737
LM2	0.984292	0.830379	0.710545	0.925432	0.375112	-0.791737	1.000000

Source: Computed by author using Eviews 3.1

Unit root test

In applying Johansen's multivariate cointegration approach and granger causality test, unit root test is conducted to ascertain the order of integration of the variables. In this vein, the study began by conducting an informal unit root test in the form of graphs. Appendix A shows the graph of the variables at level as Appendix B shows the graphs of the variables at first difference. There is a suspicion that the variables are not stationary at levels since they look trended but after the first difference was taken, the variables look stationary since the graphs look more erratic.

A formal test to ascertain the order of integration of the variables was then conducted using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. The Schwartz-Bayesian Criterion (SBC) and Akaike Information Criterion (AIC) were used to determine the optimal number of lags included in the test. The study presented and used the P-values for making the unit root decision which arrived at similar conclusion with the critical values Tables 5 reports the results of the unit root tests conducted using the ADF test whiles Table 6 reports the results of the unit root test conducted using the PP test.

Table 5: ADF test results (with intercept and trend)

Levels (Trend & Intercept)			1st Difference (Trend & Intercept)			
Var.	ADF-Statistic	Lag	Var.	ADF-Statistic	Lag	IO
ASI	-1.6235(1.7717)	4	DASI	-6.3075(0.0005)***	7	I(1)
LM2	-1.4659(0.8302)	4	DLM2	-5.5340(0.0001)***	3	I(1)
LRC	0.9754(0.9998)	4	DLRC	-3.5974(0.0388)**	4	I(1)
LRG	-0.1211(0.9934)	4	DLRG	-7.1903(0.0000)***	7	I(1)
LRGDP	-2.1951(0.4833)	4	DLRGDP	-5.8941(0.0000)***	3	I(1)
LRI	0.2811(0.9981)	4	DLRI	-7.1535(0.0000)***	7	I(1)
CT	-1.4412(0.8382)	4	DCT	-5.4109(0.0002)***	2	I(1)

Source: Computed by author using Eviews 5.0

Note: ***, ** (*) imply significance at the 1, 5 & 10 per cent levels respectively. P-values are in parenthesis

Table 5 shows that, none of the variables are stationary at levels since the null hypothesis of the presence of unit root cannot be rejected at all the convectional levels. But at first difference, all the variables are stationary. The DASI, DLM2, DLRG, DLRGDP, DLRI and DCT are all stationary at the 1% level whiles DLRC is stationary at 5% level. The results thus show that the variables are all integrated of order one.

Table 6 show the PP test results which are used as a confirmatory test to the ADF test results.

Table 6: PP test results(with intercept and trend)

Levels (Trend & Intercept)			1st Difference (Trend & Intercept)			
Var.	ADF-Statistic	BW	Var.	ADF-Statistic	BW	IO
ASI	-1.9152(0.6349)	4	DASI	-4.1957(0.0079)***	4	I(1)
LM2	-2.2782(0.4392)	5	DLM2	-3.4194(0.0580)*	5	I(1)
LRC	-0.7843(0.9614)	3	DLRC	-5.0685(0.0006)***	3	I(1)
LRG	-1.5367(0.8062)	4	DLRG	-4.1461(0.0091)***	4	I(1)
LRGDP	-1.9575(0.6126)	4	DLRGDP	-4.9669(0.0419)**	4	I(1)
LRI	-1.3505(0.8657)	3	DLRI	-5.0859(0.0005)***	3	I(1)
CT	-1.1397(0.6349)	6	DCT	-8.6322(0.0000)***	7	I(1)

Source: Computed by author using Eviews 5.0

Note: ***, ** (*) imply significance at the 1, 5 & 10 per cent levels respectively.BW is the Band Width. P-values are in parenthesis.

From the PP test results, all the variables are not stationary at levels since their p-values are bigger at any convectional level. Thus the study cannot reject the null hypothesis of the existence of unit root in these variables at level. However, at first difference all the variables are stationary and we fail to accept the null hypothesis of the existence of unit root. While we reject the null hypothesis of the existence of unit root in DASI, DLRC, DLRG, DLRI and DCT at the 1% level, we do same for DLRGDP and DLM2 at 5% and 10% respectively.

From the analysis this far one could conclude that all variables are integrated of order one and in order to avoid spurious regression the first difference of all the variable must be employed in the estimations.

Cointegration analysis

Since the focus of this study is to examine the interrelationship between stock price index and macroeconomic variables with special emphasis on real GDP, real consumption and real investment, it is imperative to test for the existence of a long-run equilibrium relationship among these variables. It is argued that cointegration can be used to establish whether there exists a long-term economic movement among variables (Johansen, 1999) with Pesaran and Shin (1995) adding that cointegration enables researcher to verify if there exist disequilibrium in various markets. With the variables selected being *I* (1), the result of the trace statistic of the Johansen cointegration test results is presented in Table 7.

Table 7: Johansen's cointegration test (Trace) results

Hypothesised No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.929254	204.6107	63.87610	0.0000
At most 1 *	0.403049	53.63731	42.91525	0.0031
At most 2	0.289590	24.22987	25.87211	0.0790
At most 3	0.079808	4.740849	12.51798	0.6339

Source: Computed by author using Eviews Version 5.0
Note:* indicates rejection of the null hypothesis. The Trace statistic indicates 2 cointegrating equation at 1% level of significance.

From Table 7, the trace statistics indicate that there are two cointegration relationships. Specifically the null hypothesis of no cointegrating relationship is rejected since the trace statistic of 53.63731 is greater than the critical value of 42.91525. The P-value of 0.0031 further confirms the rejection of the null hypothesis at 5% significance level. Thus the trace statistic indicates the existence of two long run relationships among the real GDP (LRGDP), the All-Shares index (ASI), consumption share of real GDP (RC) and Investment share of real GDP (RI).

Estimation of long run and short run coefficients

After the establishment of a cointegration relationship between variables, the long run and short run dynamic equations are estimated.

Long run estimates

Given the cointegration results and in order to establish the long run equation, Eviews automatically normalizes the first two variables in the VAR which is the real GDP and the All-shares index which are of interest. The estimated long-run equilibrium relationship for both equations derived from the normalized vectors, with standard errors in brackets and the t-statistics in parenthesis is expressed as follows:

$$LRGDP = 0.019906T + 0.166942LRI + 0.612647LRC \qquad (10)$$

(0.00195) (0.06343) (0.19526)

[10.208305] [2.6319092] [3.137596]

$$ASI = 190.8350T - 2833.708LRI - 14762.34LRC \quad (11)$$

(51.0269) (1657.71) (5102.53)

[3.73989] [-1.70741] [-2.8931412]

Note: In both equations 10 and 11, T represents time trend.

From equation 10, time trend, investment share of real GDP and consumption share of real GDP are statistically significant in explaining changes in the real GDP in the long run.

Holding all other factors constant in the long run, as time passes by, the real GDP of Ghana grows by about 2% each quarter. This is justified by the fact that as time passes by technology, institutions and human behavior changes and such changes will naturally grow the activities in the real sector. Also consumption and investment exerts a positive influence on real GDP in the long run. A percentage increase in investment leads to about 17% increase in real GDP also a percentage increase in consumption increases real GDP about 61%.

From equation 11, time trend and consumption are statistically significant in explaining variations in the All-shares index in the long run. Given that all factors are held constant, in each quarter the index grows by 190.8350. This is justified that with the passage of time there is improvement in the general perception of the market. The confidence channel is one key mechanism here and as the exchange operates day in day out the confidence of the players grow thereby increasing the returns.

Further, the statistically significance consumption exerts a negative influence on the index in the long run. As people increase their consumption, their

ability to invest in shares decreases thus a 1% increase in consumption decreases the stock market index by about 14762.

Short run dynamics

When variables are cointegrated, their dynamic relationship can be specified by an error correction representation in which an error correction term (ECT) computed from the long run equation must be incorporated in order to capture both the short-run and long-run relationships (Engel & Granger, 1987). The error correction term indicates the speed of adjustment to long run equilibrium in the dynamic model. In other words, its magnitude shows how quickly variables converge to equilibrium when they are disturbed. It is expected to be statistically significant with a negative sign. The negative sign implies that any shock that occurs in the short run will be corrected in the long run. Given that our variables are non-stationary but cointegrated, estimation of the VECM, which included a first differenced VAR with one period lagged error correction term yielded an over-parameterized model. To arrive at a more parsimonious model, insignificant variables were deleted using the t-ratios. The final model is presented in Table 8.

Table 8: Short run dynamic (VECM) results

Exogeneous variables	Endogeneous variables			
	D(LRGDP)	D(LASI)	D(LRI)	D(LRC)
EC1(-1)	-0.657473*	5562.12*	-	-0.55119*
	(0.16026)	(846.317)		(0.17336)
	[-4.10266]	[6.57214]		[-3.17954]
EC2(-1)	2.85E-05*	-0.21412*	-	-
	(8.1E-06)	(0.04286)		
	[3.50582]	[-4.99781]		
D(LRGDP(-1))	0.741180*	-1843.79*	-	-
	(0.16893)	(892.115)		
	[4.38757]	[-2.06676]		
D(LRGDP(-2))	0.522319*	-2938.64*	-	-
	(0.19574)	(1033.71)		
	[2.66844]	[-2.84280]		
D(LRGDP(-4))	-	-	-	-
D(LRGDP(-5))	-	-	-	-
D(LRGDP(-6))	-	-1834.313	-0.508770	0.195677
		(1024.51)	(0.87995)	(0.20986)
		[-1.79043]	[-0.57818]	[0.93243]
D(ASI(-1))	-	-	-	8.36E-05*
				(4.1E-05)
				[2.02357]

Table 8: Short run dynamic (VECM) results

D(ASI(-2))	-	-	-	-
D(ASI(-3))	-	-0.39852*	-	5.86E-05*
		(0.13751)		(2.8E-05)
		[-2.89811]		[2.07876]
D(ASI(-4))	-	-0.56383*	-0.000268*	-
		(0.12752)	(0.00011)	
		[-4.42150]	[-2.44428]	
D(ASI(-5))	-	-	-	-
D(ASI(-6))	-	-	-	-
D(LRI(-1))	-	-	-	-
D(LRI(-2))	-	-	-	-
D(LRI(-3))	-	-	-	-
D(LRI(-4))	0.056647*	-	-0.700551*	-
	(0.02721)		(0.12344)	
	[2.08150]		[-5.67511]	
D(LRI(-5))	-	-	-	-
D(LRI(-6))	-	-	-	-
D(LRC(-1))	-	-	-	-
D(LRC(-2))	-	-	-	-

Table 8: Short run dynamic (VECM) results

D(LRC(-3))	-	-	-	-
D(LRC(-4))	0.336760*	-	-	-0.797614*
	(0.12714)			(0.13754)
	[2.64869]			[-5.79932]
D(LRC(-5))	-	-	-	-
D(LRC(-6))	-	-	-	-
C	0.843939*	-11177.6*	-	1.596897*
	(0.37067)	(1957.55)		(0.40098)
	[2.27677]	[-5.71000]		[3.98252]
CT	-	-	-	-
LM2	-	-	-	-
LRG	-0.086401*	1146.67*	-	-0.151754*
	(0.03205)	(169.238)		(0.03467)
	[-2.69612]	[6.77548]		[-4.37761]

NOTE: * indicates statistically significant coeffeicients

Source: Computed by author using Eviews Version 5.0

The results of the VECM indicate that previous values of the real GDP are positive and significant in explaining changes in current real GDP in the short run. This is evidence by the indication that a percentage change in the first lag, second lag and third lag of real GDP, holding all other factors constant, will induce about 74%, 52% and 37% respective changes in the current period real GDP. Also the forth lags of consumption and investment are statistically significant in explaining

changes in current real GDP. A percentage increase in investment increases the current real GDP by about 6% while a same amount if increase in the past value of consumption increase current period real GDP by about 34%. This finding is consistent with the Keynesian notion that increase in consumption and investment increase real GDP by stimulating activities in the real sector. Further, government activities show to exert a negative and significant relationship on real GDP. A percentage decrease in government activities increases the real GDP by about 9%. This is an indication which confirms the notion that government activities crowed out activities in the real sector. Factors exogenous to this model explain about 84% of the changes in the current real GDP. This is seen in the positive and statistically significant coefficient.

The specification for the real sector suggest that the system adjust back to equilibrium at a speed of about 66% if the distortion originate from the real sector but it adjusts at a speed of about 0.03% in each quarter if the disequilibrium originates from the stock market. A point worth noting is that the All-shares index does not influence real sector activities in the short run thus the market cannot be classed as a leading indicator of the Ghanaian economy a finding which is consistent with that of Husain (2006) who contends that the Pakistan stock exchange is not well developed and cannot be classed as a leading indicator of the economy but contradicts the findings of Husain & Mahmood (2001).

The results again show that past values of real GDP and the All-shares index explains changes in the current period index. A percentage increase in first, second and third lags of real GDP causes the current index to decline by about

1844, 2939 and 244 respectively. Also a unit decline in the third and fourth lags of the All-shares index causes the index to increase by about 0.4 and 0.6 respectively. The negative effect of real sector activities on the All-shares index comes contrary to the expositions of Keran (1971) but may strengthen one of the many hypothesis of Binswanger (1999) which can be summed in the words of Keynes that there may be negative correlation between financial activities and growth because as Keynes (1936, p.159) noted: "when the capital development of a country becomes a by-product of a casino, the job is likely to be ill-done". In this case, speculative, activities on the financial markets are supposed to exert negative influence on the prospects for channeling resources towards "a steady stream of enterprise" (Keynes, 1936, p.376). Keynes views on finance and the real sector took a rather more pessimistic turn in the Treatise of Money (1930), where his concern was with those instances when the financial sector is allowed to "steal" resources from the individual sector leading to a fall in real output. It was also found that government activities exert appositive influence on the All-shares index. A percentage increase in government activities increases the index by about 1147 and this is an indication that confirms the view of Keran (1971) that an increase in government spending increases nominal and real corporate earning thereby increasing share prices. This is an indication the fiscal policy increases the index and hence the market returns. Factors exogenous to this model will cause the index to appreciate by 11177 approximately.

The error correction specification for the market returns suggests that the system adjusts to equilibrium at a speed of about 5552 given that the distortions

originate from the stock market but it adjust at a speed of about 0.2 when the distortion originate from the real sector. This indicates that the stock market returns stays longer in disequilibrium given that the distortion originates from the real sector.

The indication that the stock market index adjusts to equilibrium concurs with the findings of Adam and Twenebuah (2008) who drew similar conclusion for the GSE using the Data Bank index. It can clearly be stated that in the short run, real sector activities influence the market index and thus real sector activities can be said to be a leading indicator of the activities pertaining to the stock index and the market in general.

The VEC specification for investment suggests that the past values of the All-shares index and the investment itself are statistically significant in explaining changes in investment. Whereas the fourth lag of the All-shares index exerts a positive influence on investment, the fourth lag of investment exerts a negative influence on its current values. A unit increase in the index increases current period investment by approximately 0.03%. . The positive influence of the index on investment is largely expected since firms are expected to invest capital bearing in mind their Tobin's q. This implies that firms only increase their capital stock if q is greater than one since the expectation is that the market value of the firm is expected to rise by more than the cost of additional physical capital. Thus an increase in share price increases capital stock and hence investment spending.

This finding contradicts the "crowding out hypothesis" as put forward by Binswanger (1999). He contends that when financial assets offer higher returns,

more money is invested thereby leaving fewer funds to finance real investment projects. Also a percentage decrease in the fourth lag of investment increases current investment by about 70%. It is clearly indicated that the system does not adjust to equilibrium given deviations originating from both the stock market and the real sector. This is evident from the statistically insignificant error correction term.

From the VEC specification for consumption, in the short run, the first and third lags of the All Shares index, the fourth lag of consumption, government expenditure and factors aside those in this model are statistically significant in explaining changes index in the current value of consumption. A unit change in the first lag of the index increases consumption by about 0.008% whiles a unit increase in the third lag of the index increase consumption by 0.006%. These small figures can be explained by the fact that only a few Ghanaians play the exchange in the bid to smoothen their consumption. It was also found that a percentage decline in the fourth lag of consumption increases current consumption by about 80%. This is logical since delayed consumption has the tendency to increase future consumption since a decline in investment in a past period may indicate an increase in saving which has the tendency of increasing future consumption. Government activities are found to exert a negative influence on consumption since a percentage increase in government activities causes consumption to decline up to about 15%. Factors exogenous to this model exert a positive influence on consumption. Holding all the factors in the model equal, the factors exogenous to the model account for about 160% of changes in current

value of consumption. From the error correction coefficient, it can be seen that the system adjust to equilibrium at a speed of about 55% given the disequilibrium originates from the real sector.

To conclude, it was found that the index does not influence changes in the activities in the real sector in the short run but activities in the real sector affect the market index. Whereas neither consumption nor investment explains variations in the All-shares index in the short run, the index explains variations in both consumption and investment. Further as fiscal policy is influential in affecting changes in real GDP, the All-shares index, and consumption, it does not influence investment. Lastly monetary policy does not affect any of the endogenous variables in the short run.

Evaluation of Vector Autoregressive (VAR)

Since the estimation of a VAR is a means to analyzing impulse response functions and variance decompositions, inappropriately estimated VAR will render the impulse response and variance decomposition invalid. The study therefore conducted the diagnostic tests of the VAR. The results are summarized in Table 9.

Table 9: VAR diagnostic test

Diagnostic	Statistic	Conclusion
Stability condition	Highest Root is 0.955382	VAR is stable
Lag Exclusion Test	Chi-square =47.11832 p-value = 0.00007	6 lags are important and valid
Serial Correlation	LM test statistic = 19.16623 p-value = 0.2601	No serial correlation at lag order 6
Multivariate Normality	Jarque-Bera test = 12.680045 p-value = 0.1354	Residuals are normal
Heteroscedasticity	Chi-square = 615.8595 p-value = 0.3181	Residuals are not heteroskedastic

Source: Computed by author using Eviews Version 5.0

The results from Table 9 indicate that the VAR passes all the diagnostic test of stability, lag exclusion, residual serial correlation, residual multivariate normality and residual hetroscedasticity.

One other problem in the estimation of VAR models is the selection of an appropriate lag length. The lag length plays a crucial role in diagnostic tests as well as in the estimation of VAR models for cointegration, impulse response and variance decomposition (Bhasin, 2004). Appropriate lag length (p) is chosen using standard model selection criteria (AIC and SBC) that ensure normally distributed white noise errors with no serial correlation. The results of the VAR lag selection criteria are presented in Table 10.

Table 10: VAR Lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-91.2385	NA	0.000542	3.829947	4.40861	4.05429
1	110.8701	346.472	7.08e-07	-2.816791	-1.65944	-2.36809
2	143.6966	51.5844	3.96e-07	-3.417735	-1.68172*	-2.74468
3	149.6523	8.50815	5.89e-07	-3.059011	-0.74432	-2.16161
4	153.2563	4.63372	9.80e-07	-2.616297	0.277063	-1.49454
5	211.3803	66.4273	2.42e-07	-4.120724	-0.64869	-2.77462
6	244.8700	33.489*	1.52e-07*	-4.74535*	-0.69465	-3.1749*
7	255.1730	8.8311	2.34e-07	-4.541891	0.08748	-2.74709
8	274.5870	13.867	2.90e-07	-4.663822	0.54422	-2.64467

Note: * indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: Computed by Author using Eviews Version 5.0.

It can be observed from the VAR lag selection criteria presented in Table 9 that the system selected a lag length of 6. This is seen from the asterisks attached the statistic of the five lag selection criteria (AIC, LR, SC, FPE and HQ).

Variance decomposition analysis

In the long run, it is expected that equilibrium will prevail in all the concerned markets. Thus we can move from the VEC model to the VAR model. After the estimation of the VAR model, we decomposed the forecast error variance by using Sim's recursive Choleski method in order to identify the most effective instrument for each targeted variable. The forecast error variance decomposition provides complementary information for a better understanding of the relationships between the variables of a VAR model. It tells us the proportion of the movements in a sequence due to its own shock, and other identified shocks (Enders, 2004).

Thus, the variance decomposition analysis will enable us identify the most effective instrument for each targeted variable based on the share of the variables to the forecast error variance of a targeted variable. We used the VAR model (with 6 lags) to decompose the innovations of the endogenous variables into portions that can be attributable to its own innovations and to innovations in the other variables. Whiles the graphs for the variance decomposition results are shown in Appendix C, Table 11 shows the results of the forecast error variance decomposition of the endogenous variables, at various quarters, generated by the four-variable, reduced form VAR model.

Table 11: Variance decomposition results

Variables	Quarters	LRGDP	ASI	LRI	LRC
DLRGDP	2	97.53	1.66	0.76	0.06
	4	95.74	2.52	1.31	0.43
	8	85.49	1.76	3.40	9.35
	12	83.30	2.56	4.27	9.77
	16	82.07	4.25	4.50	9.18
	20	82.18	4.49	4.27	9.06
DASI	2	52.78	42.30	3.88	1.04
	4	66.21	27.65	2.95	3.19
	8	78.17	16.63	1.00	4.76
	12	81.92	11.28	1.12	5.68
	16	82.91	10.37	1.16	5.55
	20	83.59	9.95	1.25	5.22
DLRI	2	0.12	51.95	47.92	0.02
	4	2.52	55.20	44.49	0.35
	8	5.63	53.11	40.14	1.13
	12	10.88	51.11	36.97	1.04
	16	15.64	46.53	34.22	3.60
	20	15.47	45.86	34.59	4.08

Table 11: Variance decomposition results (Continued)

DLRC	2	9.82	40.09	12.49	37.60
	4	9.74	25.11	25.62	39.53
	8	15.22	26.32	23.98	34.47
	12	12.57	32.56	28.95	25.91
	16	13.85	35.81	28.65	21.69
	20	22.13	36.51	25.95	15.41

CHOLESKY ORDERING: LY LPRIVY LK LR

Source: Computed by author using Eviews 5.0

From Table 10, the largest variation in the forecast error of the real GDP can be attributed to its own shocks. The innovations of the All-shares index, consumption and investment are other important sources of variations. In the second and the fourth quarter the variation explained by the innovations in the market index is more important but in the eight, twelfth, sixteenth and twentieth quarter shocks from consumption seems to explain more variations in the forecast error of the real GDP apart from its own shocks, accounting for about 9% in the quarters.

The result also indicated that the largest source of forecast error variations in the All-shares index originates from the real GDP. It accounts for about 53%, 66%, 78%, 82% 83% and 84% in the second, fourth, eighth, twelfth, sixteenth and twentieth quarters respectively. The own shock are the second most influential factor in accounting for forecast error variation in the market index. Also important is the shocks originating from investment and consumption.

Shocks originating from real GDP, the market index and consumption in addition to own shocks are important in explaining the variations in the forecast error of investment. Shocks from the All-shares index account for the largest share of the variations whiles it accounts for over 50% in the preceding quarters, it accounts for about 47% and 46% of forecast error variations in investment in the sixteenth and twentieth quarters. Own shocks are the second important in explaining the forecast error variations in investment followed by the real GDP and the consumption which accounts for about 0.02%, 0.35%,1.13%, 1.04%, 3.60% and 4.08% of the variations in the selected quarters.

In terms of the variations in the forecast error of consumption, the shocks originating from the market index account for the largest portion of the variation (about 40%) in the second quarter. In the fourth quarter own shocks became the most important factor accounting for about 39% of the variations. It in this same quarter that the index gives the smallest variations in the forecast error of consumption and that is about 25%. In the twelfth quarter, the market index again accounts for the largest variations in the forecast error of consumption accounting for about 33% followed by investment which accounts for about 29% of the forecast error variations of consumption. In this quarter the real GDP give the smallest innovation of about 13%. In the sixteenth and twentieth quarters, shocks originating from the index are the leading cause of variations in the forecast error of consumption. Also in the twentieth quarter, own shocks are the least important in accounting for the forecast error variations with about 15%.

Granger-causality test

To find out the direction of causality between the All-shares index and the selected macroeconomic variables, the study conducts a granger causality test and the results are presented in Table 12.

Table 12: Granger causality results

Null Hypothesis:	F-Statistic	Probability
ASI does not Granger Cause LRGDP	0.53181	0.71289
LRGDP does not Granger Cause ASI	2.53538	0.05128*
LRI does not Granger Cause LRGDP	0.48243	0.74849
LRGDP does not Granger Cause LRI	1.83673	0.13613
LRC does not Granger Cause LRGDP	1.17110	0.33456
LRGDP does not Granger Cause LRC	1.16615	0.33672
LRI does not Granger Cause ASI	0.37900	0.82259
ASI does not Granger Cause LRI	2.84300	0.03333**
LRC does not Granger Cause ASI	3.59730	0.01169**
ASI does not Granger Cause LRC	2.04292	0.10219
LRC does not Granger Cause LRI	2.37497	0.06421*
LRI does not Granger Cause LRC	0.26736	0.89761

Source: Computed by author using Eviews 5.0

Note: ***, ** (*) imply significance at the 1, 5 & 10 per cent levels respectively.

The results show that the All-shares index does not cause the real GDP but at the 10% level, real GDP causes the All-shares index. This indicates that there is

a uni-directional causality form activities in the real sector to that stock index. This finding contradicts the finding of Kaplan (2008) who found that the stock return granger cause GDP but not vice versa.

At 5% level of significance, the All-Shares index granger causes investment and investment also granger causes the all-shares index at the same significance level. Thus one can conclude that there is a positive feedback effect between the market return and investment. This is as an indication of the fact that firms invest bearing in mind their "Tobin q" ratio. Further since the market is used extensively by firms to raise long term finance for their capital investment, the index is expected to affect the investment. As firms increase their investment, all things being equal, excess returns are made and this gives stock prices a strong fundamental.

Consumption granger causes investment since the study fails to accept the null hypothesis of no granger causality at the 10% significance level. This observation stems from the fact that most consumers invest in one way or the other thus consumption decisions related to saving thereby affecting investment. The study thus concludes that there is a uni-directional causality from consumption to investment.

In this section, the study found that there exists a uni-directional causality from the real sector to the stock market. Also there is a bi-directional causality between investment and the market index. The study also showed a uni-directional causality from consumption to investment.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter summarizes the study. It presents conclusions and recommendations derived from the analysis of the data collected. The chapter also includes suggestions for further research.

Summary

Understanding the link between the macroeconomy and the financial market has been a challenge to those in the fields of finance and economics. Several researchers have tried to formulate models and undertake empirical works that could help in deepening the understanding of the interrelationships therein. But the global economic crises of 2007 came as a wakeup call for all those in these fields to work harder for a better understanding of this interrelationship.

The study sought to find out the interrelationship that exists between stock price index and macroeconomic variables especially those variables representing the activities in the real sector. In trying to achieve this purpose, the study employed an analysis of secondary data. In doing this analysis the study employed the Johansen (1988) Cointegration technique to determine whether or not the variables are cointegrated. After the establishment of cointegration a

VECM was formulated to determine how variables affect each other in both the long run and the short run. The VAR approach was used to conduct variance decomposition analysis in order to identify which variables contributed to the forecast error variance of a targeted variable after which a granger causality test was undertaken to determine the direction of causality between these variables The variables included in the study are the GSE All-share index, Real GDP, Consumption share of real GDP, investment share of real GDP, government share of real GDP, level of money supply and corporate tax rate. The data used for the study was obtained in the annual format and the Gandolfo (1981) algorithm was used to interpolate quarterly series. All tests and estimation were conducted using Eviews 5.0 software.

The cointegration analysis revealed two economically interpretable long run co-movement among real GDP, All-shares index, consumption and investment. The study further revealed in the long run, both investment and consumption exerts a positive influence on the real GDP whiles only consumption exerts a negative influence on the All-shares index.

In the short run, it was found that the All-shares index does not influence the activities in the real sector since it does not influence the real GDP in this time period. This observation leads to the conclusion that the index cannot be classed as a leading indicator of the Ghanaian economy. However, it was found that the real GDP, representing activities in the real sector, exerts a negative influence on the index.

Further, in the short run, it was found that government activities exerts a positive influence on the All-shares index, the real GDP and consumption which imply that policy makers can use the expansionary fiscal policy to stimulate changes in these endogenous variables to achieve various objectives. Level of money supply was found not to exert statistically significant influence on any of the endogenous variables. Thus monetary policy cannot be used to influence any of the endogenous variables.

The study revealed that in the short run, the stock price index influences changes in both consumption and investment. The stock price index exerts a positive influence on both of these variables but neither consumption nor investment was found to exert a statistically significant influence on the index and thus the activities of the exchange.

In trying to satisfy the fourth hypothesis the study conducted a variance decomposition analysis and found that shocks emanating from the stock index, investment, and consumption and the real GDP itself are important in explaining the changes in the forecast error of the real GDP. Thus consumption, investment activities and activities in the stock market are important in explaining variations in the real sector but the shocks emanating from the real sector itself (own shock) is found to account for the largest portion of the variations. It was also found that shocks originating from real GDP, investment, consumption and the index itself are important in explaining the variation in the forecast error of the index. This suggests that variations in the activities on the stock market are accounted for by variation in the real sector activities, consumption and investment activities. It

was noted that the large chunk of the variation in the All-shares index is accounted for not by own shock but by shocks emanating from real sector activities (real GDP). With regards to the forecast error of investment, all the endogenous variables are important in explaining its variations. Shocks originating from the All- share index account for the larger part of variations in the forecast error of investment. Shocks originating from the real GDP, the All-shares index, investment and consumption itself are important in explaining changes in consumption. It is noted that no single source of shock can be classed as the most important since each quarter has a separate variable explaining the greater part of the variations.

The study then undertook a granger causality test to verify the direction of causality among the variables. It was found that real GDP causes the market index but the index does not cause the market index. This suggests a uni-directional causality from the real sector to the market index. Further, the price index causes investment and investment in turns causes the market index. This indicates that there exists a bi-directional causality between the All-share index and investment. The study also found a uni-directional relationship from consumption to investment.

Conclusions

Based on the finding of the study, the following conclusions were reached:

The study found that there is a long run co-movement between stock price index and macroeconomic variables and an indication that the stock market index

pull back to equilibrium given distortions originating from the exchange. The study concludes that the stock market does not lead activities in the real sector a suggestion that the market confirms one of the many hypotheses of Binswanger (1999) which is in connection with the claim of Keynes (1936) when he noted that "when the capital development of a country become a by-product of a casino, the job is likely to be ill-done" (p.376).

From the results of forecast error variance decomposition, the most important variable which accounts for the changes in the All-shares index is real GDP which measures activities in the real sector. In the even though activities of the exchange are important in accounting for variations in the real sector, it is shocks originating from the real sector itself that is most important. With regard to changes in investment, the study concludes that the most important factor is the shocks originating from the stock market. It cannot be easily determined the single most important factor that account for variations in consumption but the activities of the exchange, the real sector, investment and consumption itself are all noted to be important.

Consistent with the notion that development in the capital market propels investment and vice versa, the study found evidence for bidirectional causality between the market index and investment. A unidirectional causality was found between real GDP and the market index which suggest that the activities of the real sector serve as a strong fundamental from which share prices derive their value. But contrary to the finding that the market index leads the activities in the real sector, the study by its findings conclude that the index does not lead

activities in the real sector. There is evidence of a unidirectional causality between consumption and investment with consumption causing investment.

Recommendations

Taking into consideration the findings of the study, the following recommendations are proposed.

Evidence from the variance decomposition showed the real GDP as key variable in explaining variations in the stock price index and as such investor, fund managers and stock player should concentrate on the variation in real sector activities in trying to predict variations in equity returns.

With evidence of bidirectional causality between the market index and investment, the operators of the Ghana Stock Exchange (GSE), the Securities and Exchange Commission (SEC) and the Ghana Investment Promotion Council (GIPC) should encourage the listing of local firms and large multinational corporations to try to stimulate the index. By the listing of such corporations the market capitalization improves thereby increasing the index.

Also government and other policy makers should work at removing institutional and financial bottleneck associated with undertaking real investment in Ghana. Such policies could include granting more tax relieves to start up companies, encouraging capital inflows in the form of portfolio investment and FDIs by relaxing restrictions on repatriation of profit and capital gains.

In the bid to positively influence the All-Shares index, government can resort to the use of expansionary fiscal policy measures since it was found that government activities affect the market index positively.

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

With the evidence of cointegration, it is proposed that market players engage the cointegration technique in trying to determine factors that are sensitive to variations in the marker returns.

Limitations of the study

The main limitation of the study typical of such studies in developing nations had to do with the quality and limited availability of annual data on some key variables used in the study. Therefore, quarterly series was generated through interpolation for the purposes of estimation. However, the switch from a low frequency data to a high frequency one does not add any extra power to the reliability of the test but merely increases the number of data points over the time period (Hakkio & Rush, 1991; Campbell & Perron, 1991). We needed a long span of annual time series data of all the variables. However, this did not pose danger to the reliability and validity of the results because other authors such as Osei (2005) and Adam and Twenebouah (2008) have employed similar approach and

arrived at reliable and valid results. Also since the data was drawn from several sources, the researcher checked to ensure that the series are complete with no missing data points in order to ensure validity of the results.

The study used macroeconomic data that are likely to be trended and integrated (that is variables might have varying means and non- constant variance). Time series data tend to exhibit period of high volatility followed by tranquility and thus they do not have constant mean and variance. Working with such variables will no doubt bring about a high likelihood of spurious regression results. No inference can be made since the standard statistical tests like F-distribution, t-distribution and DW are invalidated.

This study thus conducted a thorough unit root tests and used a standard lag selection criteria to avoid this problems.

Areas for future research

This research investigated the relationship of only six macroeconomic factors with stock market index. However, a lot of other factors could be included in the research model for the study. Thus further researchers could consider additional variables in this relationship.

Also, the Johansen cointegration technique is criticized of having a problem with the order of integration of the variables and for this reason, future studies could consider the use of current techniques such as the Autoregressive Distributed Lag technique proposed by Pesaran &Pesaran (1997).

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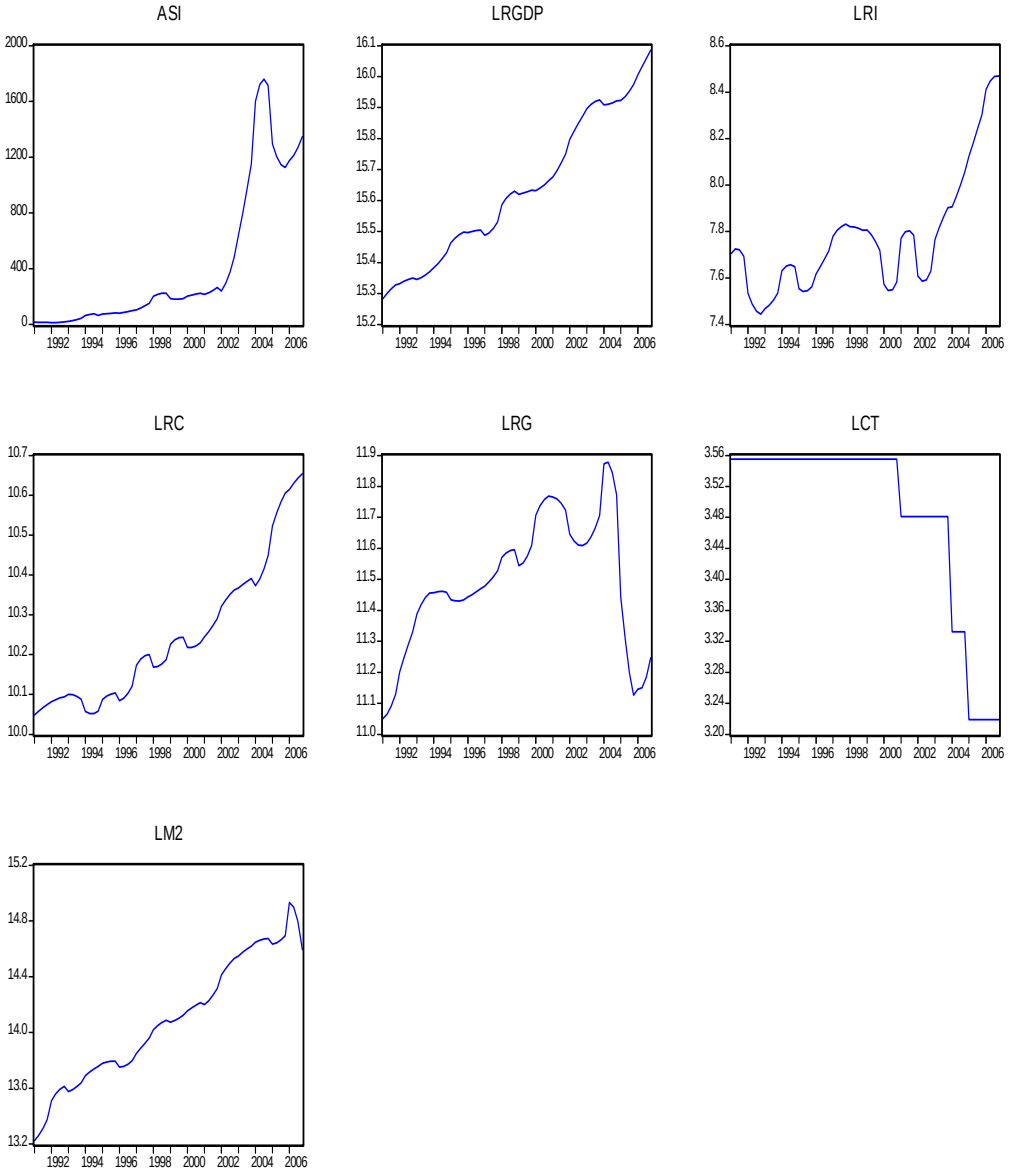
APPENDICES

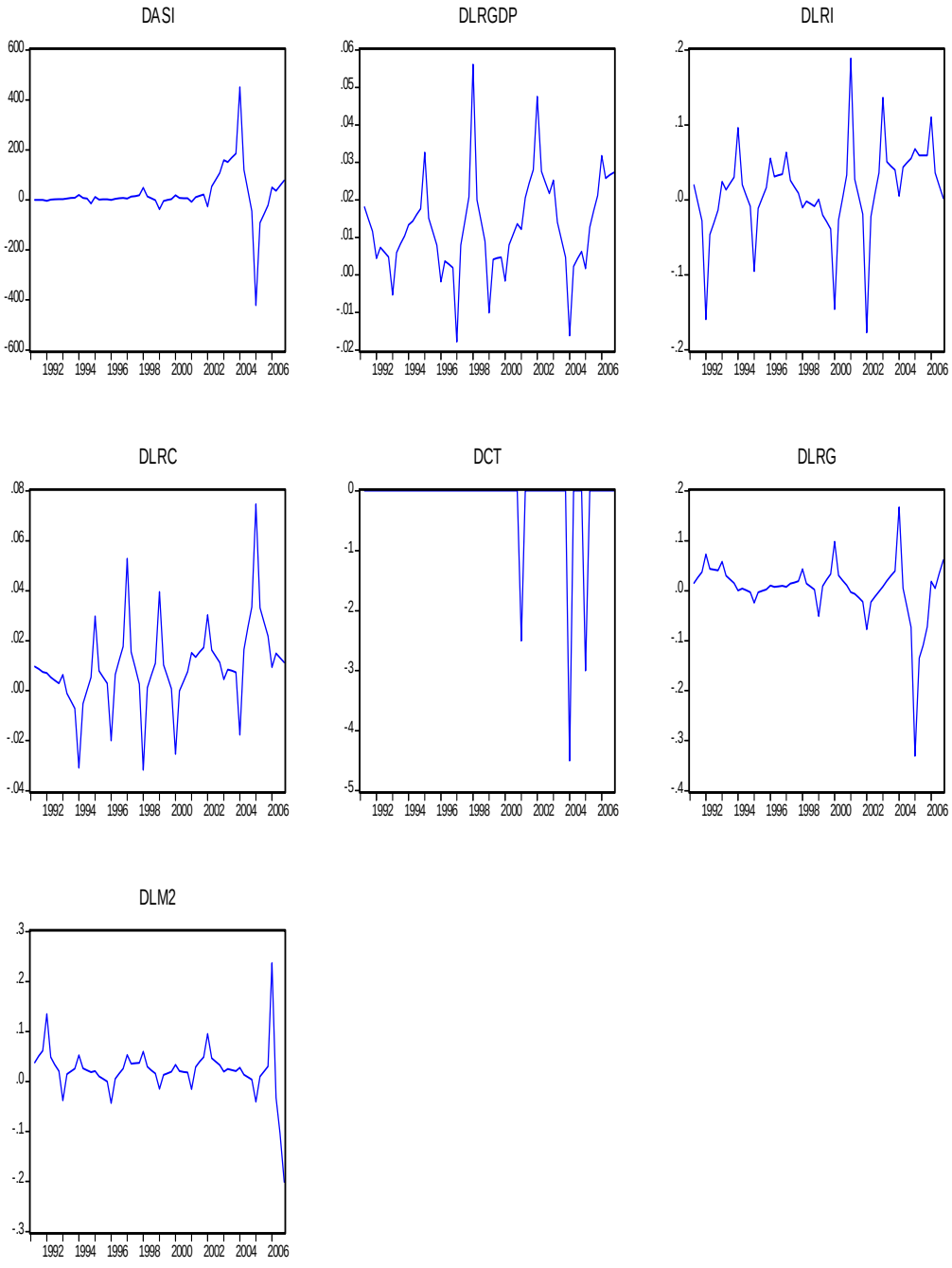
APPENDIX A

GRAPH OF VARIABLES AT LEVEL



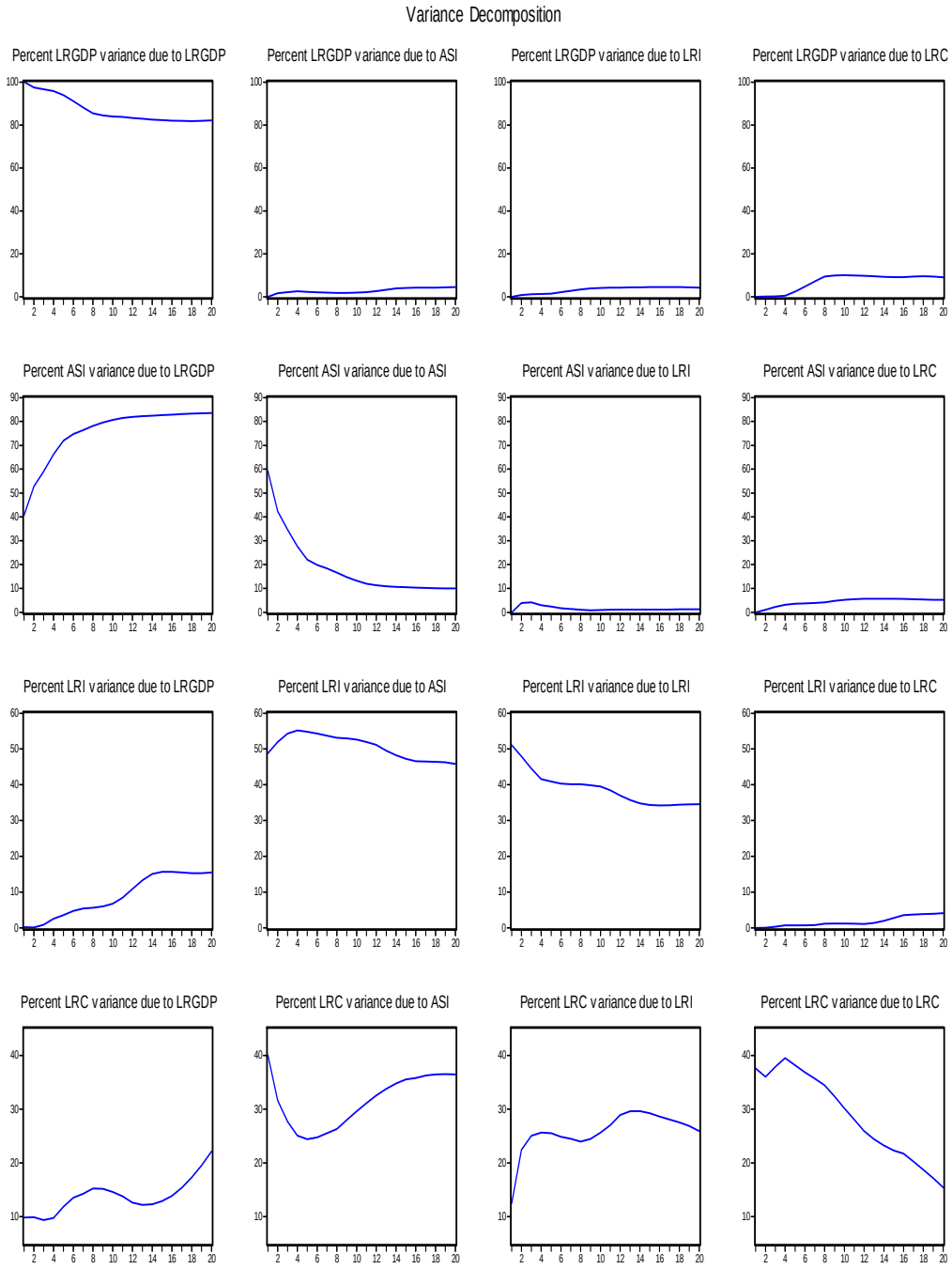
APPENDIX B

GRAPH OF VARIABLES AT FIRST DIFFERENCE



APPENDIX C

GRAPH OF VARIANCE DECOMPOSITION RESULTS



Variance Decomposition