THE RELATIONSHIP BETWEEN LAGGING MACROECONOMIC INDICATORS AND STOCK MARKET RETURN OF INSURANCE COMPANIES LISTEDIN THE NAIROBI SECURITIES EXCHANGE

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DECLARATION

I declare that the work in this dissertation has not been previously published or submitted elsewhere for award of a diploma. I also declare that this is my own original work and contains no material written or published by other people except where due reference is made and author duly acknowledged.

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ABSTRACT

The Nairobi Stock Exchange is a very important institution in the local capital markets. Public companies are able to raise capital and equally the government is able to borrow through the various treasury instruments. Insurance companies have utilized this stock exchange to borrow capital. Traders invest in the listed firms with the expectation of capital appreciation in the form of price increase and income through dividend returns. Among the many factors that define the expectations of the market players and thus the stock price movements are the lagging macroeconomic factors. The government through its policy and regulatory role has a pivotal role on the macroeconomic indicators; interest rate, inflation rate and exchange rate. In this regard, the study sought to determine the relationship between lagging macroeconomic indicators and stock market return of insurance companies listed in the Nairobi securities exchange. This study adopted a correlational research design to explore the relationship between the lagging macroeconomic indicators and insurance stock market return. Monthly time series secondary data for a five year period 2009 to 2013 for the variables are used. Vector Error Correction Model (VECM) was employed to achieve the three objectives of the study. The study concludes that there exist a relationship between interest rate and the insurance stock market return. However, the macroeconomic variables, inflation rate and exchange rate had no significant effect on the insurance stock market return.

Key Words: Stationarity, Cointegration, Vector Error Correction, Causality, Lagging Macroeconomic variables.

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DEDICATION

I dedicate this dissertation to my Dad and Mum.

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LIST OF ABBREVIATIONS

NSE	Nairobi Stock Exchange
CBK	Central Bank of Kenya
KNBS	Kenya National Bureau of Statistics
GDP	Gross Domestic Product
IMF	International Monetary Fund
ADF	Augmented Dickey Fuller
ECM	Error Correction Model
GDP	Gross Domestic Product
OLS	Ordinary Least Squares
VECM	Vector Error Correction Model

OPERATIONAL DEFINITION OF TERMS

Lagging macroeconomic factors: Lagging macroeconomic indicators are used to measure their influence on past performance(Levyne & Masood, 2013)

Stock exchange market: Refers to the aggregation of buyers and sellers of stocks including securities listed and privately traded in an organized exchange (Naik, 2013).

Stock returns: The gain or loss of a security in a particular period (Naik, 2013).

Stationarity: A state in time series data whereby its statistical properties such as mean, variance and autocorrelation are all constant over time.

Causality: Is the ability of past values of one variable to predict another variable.

Cointegration: Existence of a long-run economic relationship between variables.

CHAPTER ONE

INTRODUCTION

1.1 Back ground to the Study

Macroeconomic indicators are statistics published regularly by government with the primary purpose of indicating the current economic status. They can be classified as either leading indicators if they can be used to future economic prospects. Leading economic indicators include: manufacturing companies activities, retail sales, inventory levels, building permits, housing markets conditions and levels of new business start-ups. Lagging macroeconomic indicators are used to measure their influence on past performance. They include: inflation rate, exchange rate, gross domestic product, levels of unemployment, consumer price index, home currency strength, balance of trade, interest rate, corporate profits as well as value of commodities in relation to US dollar (Levyne & Masood, 2013)

A market that deals with the exchange of securities of publicly listed companies, derivatives and government securities such as bonds and treasury bonds is known as stock market. This market can be used as an indicator of economic performance as well as its development. Both investors and state corporations are concerned with the state of stock market since it can be a recipe for attracting potential local and international investors. Through the stock both government and publicly listed companies can raise both long-term and short term finances, thus its development can be an indicator of economic development. Empirically it has been shown that there is a significant relationship between economic development and stock market performance (Asaolu & Ogunmuyiwa, 2011; Evans Kirui, Wawire, & Onono, n.d.) Since these investors will be exposed to risk the level of investment will lead to higher demand of insurance products.

An insurance company is a business that provides coverage, in form of compensation resulting from loss, damages, injury, treatment or hardship in exchange for premium payments. An insurance is a contract in which an individual or entity receives financial protection or reimbursement against losses from an insurance company. In the contract, an individual transfers the risk of loss to another party who guarantees compensation to the insured upon suffering loss. The promisor is called the Insurer and the promisee is called the Insured(Dionne, 2000). Insurance premium is the monetary consideration paid by the Insured to the Insurer for the cover granted by the Insurance policy. The Insurer takes on a number of clients (Insured) who pay small premiums that form an aggregate fund called the premium fund (Dionne, 2000). The probability of the losses and the severity are estimated mathematically based on past experiences and actuarial techniques upon which premiums are calculated. These premiums are the accumulated in a common fund or pool, to meet the losses upon their arising (Grose, 1992). This concept is founded on operation of large numbers or averages, where risks are pooled together through paying small premiums which are a small portion of the insured values and aggregated to form a premium fund out of which those who suffer loss are compensated Young, (1994).

In Kenya, the insurance companies are regulated by Insurance Regulatory Authority. The Insurance Regulatory Authority as part of its core mandate licenses insurance/re-insurance companies and intermediaries. These include Insurance Companies, Insurance Agents, Insurance Brokers, Medical Insurance Providers, Insurance Investigators, Motor Assessors, Loss Adjusters, Insurance Surveyors, Claim Settling Agents and Reinsurance companies. They have to comply with a number of provisions before engaging in the business of underwriting risk. The criteria for licensing companies and intermediaries are specified in the Insurance Act. In addition to the Act, the Authority normally issues circulars and guidelines to be followed by insurers and intermediaries in seeking to renew their

licenses. Part of the information submitted by insurers/re-insurers when seeking to be licensed include although not limited information on directors, managers, representatives or other persons working for the company, information on owners, nature of risks the company intends to cover, reinsurance programme, proof of adequate own funds to carry out business, business plan and information on the technical bases for the calculation of technical provisions. In the year 2014, there were a total of 53 insurance companies in Kenya in operation offering different insurance products. Out of the 53 companies, only six are listed on the Nairobi stock exchange.

The Nairobi Stock Exchange (NSE) was registered under the Societies Act (1954) as a voluntary association of stockbrokers and charged with the responsibility of developing the securities market and regulating trading activities. Business was transacted by telephone and prices determined through negotiation. As of December 2014, the securities exchange had a total of 153 companies. These companies have been classified into ten different industries namely: Agricultural, Automobiles and Accessories, Banking, Commercial and Services, Construction and Allied, Energy and Petroleum, Insurance, Investment, Manufacturing and Allied and finally Telecommunication and Technology. It is a requirement that the listed firms submit their financial statements (NSE, 2013). The exchange has experienced great growth even with the introduction of the Growth Enterprise Segment Markets. Under the insurance category, there are total of six firms, See Appendix II.

Empirically it has been shown that stock returns are determined by macroeconomic fundamentals. For example Ross(1976) applied arbitrage pricing model to determine the value of securities. Though, they were no clearly determined indicators of stock prices, Ross posits that there is a relationship between the stock market return of a single asset and several macroeconomic indicators. Chen, Roll, & Ross (1986) argued that the following

macroeconomic factors have a relationship with the stock market return: surprises in inflation, surprises in Gross National Product as indicated by industrial production index, changes in investors' confidence due to fluctuations in corporate bond prices and changes in bond's yield curve. According to Ochieng & Adhiambo(2012) there is a significant relationship between macro-economic indicators and stock market return among all companies listed in NSE. Sing (2014) investigated the relationship between macroeconomic indicators and Indian stock market. Results of the study show that the index of industrial production, wholesale price index, money supply and crude oil price had positive relationship with stock market performance. Foreign institutional investment also had a positive significant relationship on stock market performance. The results also indicate that interest rate, trade deficit, exchange rate and gold price have an inverse relationship with stock market performance.

There has been interest among academicians to investigate the relationship between macroeconomic indicators and stock market return. Acikalin, Aktas, & Unal (2008) show a positive significant relationship between GDP, foreign exchange rate and stock market returns among listed companies in Turkey. Fama (1981)shows a positive significant influence of macroeconomic indicators on stock market returns in US securities market. Ajao & Oseyomon (2010) showed a significant relationship between macroeconomic indicators (GDP, inflation, interest, money supply, exchange and industrial production index) and all share indexes among all listed companies in Nigeria. A Singapore case to investigate the forecasting effect of macroeconomic indicators on share prices showed that money supply and foreign exchange has a significant influence on share prices among quoted companies (Büyüksalvarci & Abdioglu, 2010).

1.2 Problem Statement

The dynamic interrelationship between lagging macroeconomic indicators and stock market returns have an influence on current and potential investors, government policies, management of both public and private companies owing to their influence on operations costs as well as the expected return at the end of accounting cycles.

Past studies such as Olweny & Omondi (2011) showed that macroeconomic indicators particularly foreign exchange rate, interest rate, inflation rate all significantly influenced market returns. Osoro (2013) showed that inflation rate, foreign exchange rate, GDP fluctuations and interest rate all had a significant influence on stock market return of manufacturing companies listed on the NSE. Ozemhoka & Oni (2014) showed gross domestic product, exchange rate lending rate, money supply, exchange borrowing rate had significant influence on commercial banks risk taking attitude.

Kihara (2012) states that insurance plays a significant role in a country's economic growth and offers financial protection to an individual or firm against monetary losses suffered from unforeseen circumstances. This is because the world is characterized by risks and uncertainties and insurance has evolved as a way of providing security against the risks and uncertainties.

All the above studies have concentrated on the effect of the lagging macroeconomic indicators on the general stock market and other industries but none has addressed the effect of the indicators on the stock market returns of the insurance industry particularly in Kenya. Even though Murungi(2014) investigated the influence of macroeconomic indicators on insurance company’s performance in Kenya, the measure of performance in the study was return on assets.

An investigation into the relationship between lagging macroeconomic indicators and stock market return of insurance companies listed in the Nairobi securities exchange will aid the stakeholders in the insurance industry particularly in Kenya to decide on the managerial, operational and sustainable growth decisions that reflect the responses from the macroeconomic factors. It will also inform investors on strategies to make maximum returns from their investment in stock market based on the economic trends as informed by the lagging macroeconomic indicators. Insurance and capital markets regulators will also formulate policies and decisions for ensuring and creating smooth trading and investment atmosphere in the stock market based on their experience and knowledge on predictable stock market price trends.

This study therefore sought to establish the relationship between lagging macroeconomic indicators; inflation rate, interest rate and exchange rate and the stock market return of insurance companies listed in the Nairobi Stock Exchange between 2009 and 2013. Monthly statistics for the variables were collected.

1.3 Objectives of the Study

1.3.1 General Objectives of the Study

The main objective of the study was to investigate the relationship between lagging macroeconomic indicators and stock market return of insurance companies listed in the Nairobi Securities Exchange.

1.3.2 Specific Objectives of the Study

The study was based on the following objectives:

i. To find out the relationship between inflation rate and stock market return of insurance companies listed in the NSE.

ii. To find out the relationship between exchange rate and stock market return of insurance companies listed in the NSE.

iii. To find out the relationship between interest rate and stock market return of insurance companies listed in the NSE.

1.4 Research Questions

The study sought to answer the following research questions:

iv. Is there a significant relationship between inflation rate and stock market return of insurance companies listed in the NSE?

v. What is the relationship between exchange rate and stock market return of insurance companies listed in the NSE?

vi. What is the relationship between interest rate and stock market return of insurance companies listed in the NSE?

1.5 Significance of the Study

An efficient equity market is depicted by its informational efficiency in that the prices of securities traded in the market act as though they fully reflect all available information and react instantaneously [Fama (1970), Strong & Walker (1987)]. Thus, the price of the insurance company shares depicts all information available at any single time. Accordingly, if macroeconomic activity affects stock prices then an efficient stock market instantaneously incorporates all available information about economic variables. In an inefficient market, there will be arbitrage opportunities in the market.

The results and conclusion of this study will therefore assist the entire interested group to decide managerial, operational, sustainable growth decision efficiently. It will also inform investors on strategies to make maximum returns from their investment in stock market based on the economic trends as informed by the lagging macroeconomic

indicators. Insurance and capital markets regulators will also formulate policies and decisions for ensuring and creating smooth trading and investment atmosphere in the stock market based on their experience and knowledge on predictable stock market price trends.

The study would be crucial to quoted and non-quoted insurance companies as it will provide answers to the role of lagging macroeconomic indicators on stock market returns among insurance companies.

The study would be equally significant for the insurance policy makers as it will avail information on the effect of lagging macroeconomic indicators on insurance stock market returns as such they can be better placed to make policy and strategies.

The current study will be beneficial to the government through the various regulatory agencies such as insurance regulatory agency.

The study shall contribute to empirical findings and from its recommendations future research may be carried out. Future researchers will benefit from the documented evidence of the relationship between lagging macroeconomic indicators and insurance stock market returns.

1.6 Scope of the Study

The study was limited to listed and actively trading companies in insurance segment of NSE in the period between 2009 -2013. Even though there are many macroeconomic indicators, the current study was limited to foreign exchange rate, inflation rate and interest rate. The dependent variable (stock market return on insurance) was measured by computing an insurance stock index from the average monthly share prices of the insurance companies

listed on the NSE for this period. Monthly statistics on the above variables were collected over the five year period 2009 to 2013.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section analyses literature related to the relationship between macroeconomic determinants and stock market return of insurance companies quoted in NSE. The main source of literature is past studies and a detailed study of the three objectives which include: to find the relationship between inflation rate and stock market return of securities among quoted insurance companies in NSE, to establish the relationship between exchange rate and stock market return of securities among insurance companies quoted in NSE and to find out the relationship between interest rate and stock market return of securities among insurance companies quoted in NSE. In addition the study has the theoretical framework, conceptual framework, critique of the literature, research gaps and summary of the literature.

2.2. Theoretical Framework

In this section, a review of the major theoretical arguments regarding the relationship between the macroeconomic variables and the stock market returns is done. Economic theory propose a number of approaches that discuss the relationship. Purchasing power parity, Fishers Theory of interest rates and the Arbitrage Pricing Theory are discussed.

2.2.1 The Purchasing Power Parity (PPP)

Parity between the purchasing powers of two currencies establishes the rate of exchange between the two currencies. When inflation rate differential between two countries changes, the exchange rate also adjusts to correspond to the relative purchasing powers of the currencies.

From the law of one price concept, differences in prices of an item from one country to another would lead to arbitraging opportunities in the market (Krugman, Obstfeld &

Melitz, 2011). Individuals would buy an item from the market where it is lowly priced and sell it to the market with a higher price. This process will continue until the prices match and thus no more arbitraging.

On the other hand, in comparison to the one price theory, the purchasing power parity theory postulates that the exchange rate between one currency and another is in equilibrium when their domestic purchasing powers at that rate of exchange are equivalent. According to the theory, in the long run, price differentials between countries are not sustainable because the market forces of demand and supply will equalize the price difference of the two countries and thus change the exchange rates. The market forces thus explain the process of arbitraging.

This theory is crucial in explaining investment within and outside a country as it affects the flow of moneys across borders. The relationship thus defines the effect on the return in the stock market due to inflation differentials.

2.2.2. Fisher's Theory of Interest Rates

Fisher's theory of interest rate is of the idea in order to keep real interest rate stable, a country's monetary policy should mainly concentrate on managing expectations of inflation. The goal is to encourage savings and investment. It is in this regard that post Keynesians such as Cottrell (1994) and Smithin (2003) have promoted fisher's theory. The introduction of the Nature of Capital and Income (1906) and interest rate (1907) is the basis for the concept of capital investment in Irving Fisher's theory. This concept has been crucial in Fisher's theory of interest (1930).

The Irving Fisher's theory assumes that all capital circulates in the economy and is consumed in the production process completely. Therefore, there is no stock of capital, K, (Olweny and Omondi, 2011). Thus, given the required real rate, any forecasted growth (or

reduction) in the rate of inflation will lead to growth (or reduction)in the nominal rate of interest via arbitrages between future and present aggregate incomes. This means that if at time t = 0, the economy is at a full employment equilibrium with no inflation forecasted, then, suddenly, at time t= 1,the central bank is expected to increase the money supply in period 2 such that, through quantity theory of money, there is an expected inflation, the aggregate real income increase at a faster rate than forecasted expected real amount of money that needs to be reimbursed.

The need to smooth consumption gives the motivation to purchase some present income while foregoing some future income. This leads in an upward pressure on the nominal rate. Following this argument of Fisher's theory of interest rate, it is assumed that as interest rate grows, then inflation reduces, whereas as interest rate drops, inflation rate increases. Therefore, if $\frac{dI}{dr} < 0$, it implies that investment is inversely related to interest rate. We can deduce therefore that insurance stock being investments, then interest rate is inversely related to it.

2.2.3 The Arbitrage Pricing Theory

Arbitrage Pricing Theory (APT) was proposed by Stephen Ross in 1976. It is an asset pricing theory which states that the expected return of an investment or a financial asset can be modeled as a linear relationship of various macroeconomic variables and where the degree of correlation to changes in each variable is represented by a beta coefficient. The model derived rate of return will then be used to obtain the price or value of the asset correctly. The asset value should equal the expected end of period asset value or future cash flows discounted at the rate implied by the model. If the asset value changes, arbitrage should bring it back to the line.

The failure of empirical testing of CAPM led to the development of the arbitrage pricing theory (APT).APT agrees that though many different specific forces can influence the return of any individual stock, these particular effects tend to cancel out in large and well diversified portfolio. This is the principle of diversification and it has an influence in the field of insurance.

Arbitrage Pricing Theorem suggests that in equilibrium, there is no return on an arbitrage portfolio (i.e. one with zero investment, and zero systematic risk). If there is a return, then it would be eliminated shortly through arbitrage trading to improve the expected returns. According to Ross (1976), when the arbitrage opportunities have been exhausted, then the expected return $E(R_i)$ can be shown as follows:

$$E(R_i)=R_f + \beta_1(R_1-R_f)+\beta_2(R_2 -R_f)+\text{--------}+ \beta_n(R_n-R_f)+\acute{\varepsilon}_i \quad \text{.....(i)}$$

Where,

$E(R_i)$is the expected return on the security

R_f is the risk free rate

B_i is the sensitivity to changes in factor i

$\acute{\varepsilon}_i$ is a random error term.

The insurance uses the law of large numbers to forecast future uncertainties and predict its losses on large pool of such risk. Political, economic, technological, legal and environmental factors have major influences on insurance losses by affecting the rate of claims.

2.3 Empirical Review

Several empirical studies have investigated the relationship between macroeconomic variables and stock market returns. These are as discusses below.

2.3.1 Inflation Rate and Stock Market Return

Geetha, Mohidin, Chandran, & Chong (2011) investigated the relationship between inflation rate and stock market returns. Inflation was categorized into expected and unexpected. Secondary monthly time series data from January 2000 to November 2009 was analyzed. Inflation rate was measured using consumer price index and was transformed into logarithms.

To test for stationarity, Augmented Dickey Fuller test was conducted. Cointergration test was carried out to determine cointergrating vectors so as to determine long run relationship. The short run relationship was determined using vector error correction modeling. ADF results showed that the inflation rate for China, Malaysia and USA, was stationary. Cointergration test through the use of Johansen Cointergration test showed that inflation rate was cointergrated with stock market returns. Thus there was a long run significant relationship between inflation rate and stock return. In china, a short term significant relationship between the stock market and inflation was depicted while in Malaysia, it was insignificant.

Omotor (2010) investigated the relationship between inflation and stock market returns among in Nigeria. Monthly and quarterly secondary data in 1985-2008 was used. Results of the study showed a positive significant relationship between inflation rate and stock return for the whole period under consideration. The study period was further classified into three sub groups; first group in 1985-1997 showed a negative insignificant relationship, second group 1985-2008 showed a positive significant relationship and 1997-2008 sub-groups showed a positive significant relationship. ADF test was used to test for stationarity;

results showed that the series levels were non-stationary though the first differences tests were stationary. The long run relationship was tested using Johansen Cointergration test showed a significant relationship between stock returns and inflation rate.

Aliyu (2009) investigated inflation effects on stock volatility in Ghana and Nigeria. The study applied Generalised Autoregressive Conditional Heteroskedasticity (GARCH) model on monthly inflation time series data for Ghana and Nigeria. Moreover, asymmetric shocks were investigated using QGARCH model. There was a weak support of efficient hypothesis in Nigeria while the theory was strongly supported in Ghana. In both Nigeria and Ghana, a significant positive relationship between inflation rate and stock returns was depicted.

2.3.2 Exchange Rate and Stock Market Return

By examining the impact of stock market liberalization on the foreign exchange rate and stock markets, Phylaktis & Ravazzolo (2005)found that stock and foreign exchange markets are positively related, and that the US stock market acts as a conduit for these links. Tabak (2006) found that a linear Granger causality exists between stock prices and exchange rates, with a negative correlation in Brazil after its abandonment of the crawling peg exchange rate regime in 1999, and this supports the portfolio approach. Murinde & Poshakwale (2004)found that for the pre-euro period, stock prices unidirectional Granger-caused exchange rates to shift only in Hungary, while bidirectional causality relations existed in Poland and the Czech Republic.

After the adoption of the euro, exchange rates unidirectional Granger-caused stock prices to shift in all these countries. Horobet & Ilie (2007) also found a lack of causality before 2004, when the exchange rate was controlled by the Romanian National Bank; while finding that several causality relationships existed after 2004 following the adoption of a

more flexible exchange rate. The Granger test results from Horobet & Ilie (2007) indicate that exchange rates are the leading variables for stock prices, and that the stock market adjusts quite dramatically to changes in exchange rates after one month.

Tian & Ma(2010)investigated the relationship between stock returns and foreign exchange rate using ADRL Cointergration approach in China. Results showed there was Cointergration between share returns and foreign exchange. Money supply and exchange rate had a positive on stock returns.

2.3.3 Interest Rate and Stock Market Return

The relationship between interest rate and stock returns in developed and developing countries was conducted by Alma (2009). Time series and panel data analysis were employed in this study and results indicated a negative significant relationship between interest rate and share prices. Arango, González, & Posada, (2002) in their study of Bogota stock market noticed nonlinear and inverse relationship between the share prices and the interest rate. The interest rate was measured using the inter bank loan interest rate. The model captures the stylized fact on this market of high dependence of returns in short periods. Hsing (2004) adopts a structural VAR model to determine the relationship between stock prices and several endogenous variables such as output, exchange rate and real interest rate. An inverse relationship between stock prices and interest rate was depicted.

According to Zordan (2005), historical evidence show that stock prices and interest rates are inversely correlated. He observed cycles from 1880's. Periods subsequent to World War II were more relevant. Low inflation was depicted from the late 1940's to the mid 1960's, while interest rates were both low and stable. The stock market return during this period depicted positive return. From historical trends as depicted in the 1877 to 1906 cycle, the 1906 to 1920 cycle, the 1920 to 1929 cycle, the 1929 to 1949 cycle, and the 1949 to 1966

cycle, commodity prices and interest-sensitive asset classes like stocks, bonds, and real estate have depicted an inverse relationship.

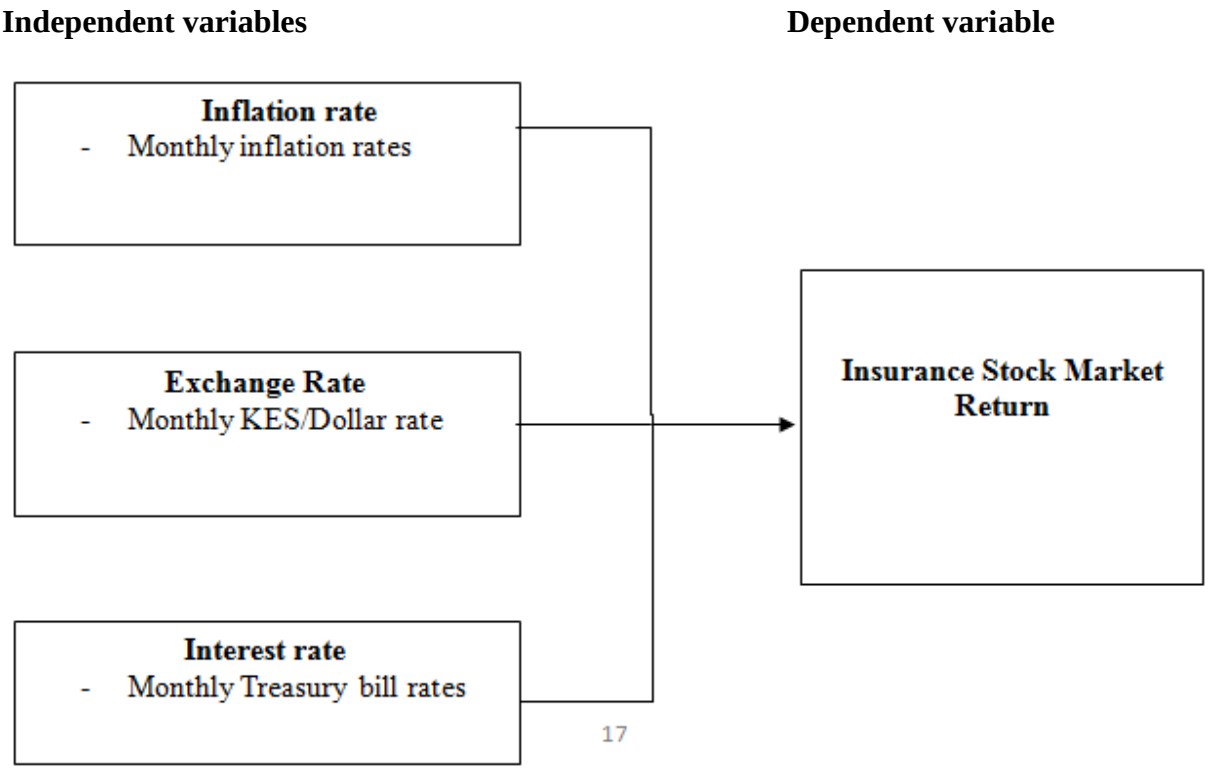
Alam & Uddin (2009)studied the relationship between changes of share price and changes of interest rate on Dhaka Stock Exchange (DSE) and reported that a change of interest rate has significant negative relationship with changes of share price.

2.4 Conceptual Framework

A conceptual framework is the diagrammatic presentation of variables, showing the relationship between the independent variable and dependent variables. In this study, the independent variables were; inflation rate, exchange rate and interest rate. The study sought to understand how these independent variables determine the stock return among listed insurance companies in NSE. Stock return is measured by the respective insurance stock index as given in NSE share index. The relationship between the independent variables and dependent variable is presented schematically in the conceptual framework in Figure 1.

FIGURE 1

Conceptual Framework



Source: Author (2015)

2.5 Measurement of Key Variables

A description of the method of computation of the variables under study is discussed below. These data is then used for analysis.

2.5.1 Insurance Stock Index

The monthly insurance stock index is a reflection of the return of insurance companies in the stock market. The parameter is measured by calculating the market value weighted index of all the insurance companies listed on the NSE in the period of study. Market value weighted index also known as capitalization weighted index is a stock index whose components are weighted according to the total market value of their outstanding shares.

$$MVWI = \frac{\sum \text{Price\_new} * \#\text{Shares}}{\sum \text{Price\_base} * \#\text{Shares}} * \text{Base Period Index} \quad \text{(ii)}$$

Where: MVWI- Market value weighted index

Price_New- Price at month t

Price_base- Price at base period

Base Period Index- Stock index at base period

The average monthly prices and number of shares for the respective insurance companies are collected for the NSE daily reports for the period of study.

2.5.2Lagging Macroeconomic Indicators

The lagging macroeconomic indicators, interest rates, inflation rates and exchange rates are collected from the Central Bank of Kenya and Kenya National Bureau of Statistics publications and records as is. Monthly averages for the data are computed from the daily prices.

TABLE 1
Operationalization of the Variables

	Variable	**Indicator**	**Measure**
Dependent	Insurance Stock return	Stock market Return	Average monthly insurance stock Index
Independent	Foreign exchange rate	Monthly exchange rate fluctuation (Kshs/$)	Average monthly exchange rate (Kshs/$)
	Inflation rate	Monthly inflation rate fluctuation.	Monthly inflation rates
	Interest rate	Monthly interest rate fluctuation.	Monthly Central Bank Rate(CBR).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology employed to examine and estimate a model which explains the relationship between lagging macroeconomic indicators and insurance stock market returns. A research design for the study is first outlined and then the model specification. The variables which will be used in the study are explained, including data type, sources of data, data collection and data analysis techniques to be employed.

3.2 Research Design

A research design is a plan and structure of investigation of conceived to answer specified research questions. It provides a blueprint of data collection, measures and analysis. It enhances that the research results are reliable, valid and credible.

This study adopted a correlational research design to explore the relationship between the lagging macroeconomic indicators and stock market return of insurance companies listed on the NSE. The study adopted the design since the research seeks to determine whether there exists a relationship between lagging macroeconomic indicators and insurance stock market returns. Time series secondary data for the insurance index and the lagging macroeconomic variables are used.

3.3 Target Population

The target population consisted of all the stocks of the insurance companies listed at Nairobi Stock Exchange as at December 2013 from which the Insurance Stock Index is computed. With all the participants included, a correct picture of the stock market position could be presented.

As at December 2013, there were six insurance firms in the Nairobi Stock Exchange. These insurance firms are as listed in Table 2 below:

TABLE 2

Target Population

No.	Name of Insurance Company
1.	Jubilee Holdings Limited
2.	Pan Africa Insurance Holdings Limited
3.	Kenya Re-Insurance Corporation Limited
4.	Liberty Kenya Holdings Limited
5.	British American Investments Company (Kenya) Limited
6.	CIC Insurance Group Limited

3.4 Sample Design

For the five year period between 2009 and 2013, monthly statistics of the insurance stock index and the lagging macroeconomic indicators; interest rate, inflation rate and foreign exchange rates were collected and analyzed.

Data collected over the 60 months period could give more comprehensive, accurate and relevant results. For the computation of the insurance stock index, average monthly stock prices over the 60 month period for four insurance companies as listed below were collected.

TABLE 3

Sample Design

No.	Name of Insurance Company
1.	Jubilee Holdings Limited
2.	Pan Africa Insurance Holdings Limited
3.	Kenya Re-Insurance Corporation Limited
4.	Liberty Kenya Holdings Limited

This is because two insurance companies, Britam and CIC Insurance Company were introduced in the NSE much later.

3.4 Data Type and Source

Data used for this study included three important macroeconomic variables and the insurance stock market return. The dependent variable was the monthly insurance stock market index while the independent variables were the lagging macroeconomic variables. The lagging macroeconomic variables were the average monthly 91-day Treasury bill rates, inflation rates and the exchange rates.

Monthly data series for the period from January 2009 to December 2013 (60 monthly observations) were considered. These secondary data was collected from the periodical reports and websites of Nairobi Securities Exchange, Kenya National Bureau of Statistics, Central Bank of Kenya and other economic surveys produced by the government agencies.

3.5 Data analysis

The study employed econometric techniques that explain the nature of the relationship between the variables. Being time series data, Augmented Dickey Fuller Test (ADF), Phillip Peron's test and correlograms are used to study the stationarity of the data. Cointegration test is then conducted to test for the presence of long run equilibrium among the variables. With

Cointegration, we can separate short and long-term relationship among variables. It helps determine the number of cointergrating vectors. Vector Auto-Regression (VAR) was employed to generate the impulse response functions that were used to establish the effects of lagging macroeconomic variables on insurance stock market return. Variance decomposition analysis is then used to explain the proportion of the variance in the insurance index as a result of its own shock and shocks of the other variables. The method allocates weights to each identified shock in the equation at every time period for a particular variable (Odour, 2008).

Statistical software (EViews 7.0) was used in the determination of a relationship between the lagging macroeconomic indicators and stock market return among quoted insurance companies. Tables and graphs are used to present the results of the analysis.

3.6 Time Series Properties

Time series analysis is crucial in empirical modeling of the relationship between the macroeconomic variables and the stock market return. The non-random behavior of the time series data could undermine the usefulness of the standard econometrics methods if it was applied directly without considering time series properties of the data (Russel & Mackinon, 1993; Gujarati, 1995). Stationarity tests, Cointegration tests and error correction mechanism are therefore carried out.

3.6.1 Stationary Tests

The study used time series data and therefore, there was need to determine whether the variables in question are stationary or non-stationary. Stationary series have finite variance, transitory innovations from the mean and a tendency to return to its mean value as opposed to non-stationary series (Gujarati & Porter, 1999). Thus there was need to ensure that the variables to be estimated had their means and variances as constants independent of time.

This is the case with stationary series. If OLS is used to estimate the relationships of variables of a non-stationary series, there is the likelihood to have misleading inferences which appear either as spurious regressions or inconsistent regression problems. Conventional tests of hypothesis based on statistics computed from such variables are likely to be biased towards rejecting the null hypothesis even when it should in reality be accepted.

This study used the Augmented Dickey Fuller unit and Philip Perrons root tests to test for stationarity. These are the most efficient and simplest test for stationarity. These tests take into account the possible autocorrelation in the error process.

The left hand side variables are lagged (ΔXt) as additional explanatory variables so as to approximate the autocorrelation (augmentation). This improves the statistical fit of the equation and r is more efficient with added information. The basic equation used in the PP test remains the same as the one used in the ADF test. ADF is expressed in the form of

$\Delta X_t = \mu + rX_{t-1} + \partial T + \Sigma^{k}_{i=L} r_i \Delta X_{t-i} + \varepsilon_t$ …… (iii)

The number of lags (K) for ΔX_{t-1}should be relatively small to save the degrees of freedom, but large enough to allow the existence of autocorrelation in the error term. The hypotheses are:

H0: Variables are not stationary

H1: Variables are stationary

Whereby, the rejection of H_0 for the alternative hypotheses indicates stationarity of the variables. There is also danger of over differencing in the ADF and care needs to be exercised.

3.6.2 Co-Integration and error correction mechanism

Trends whether stochastic or deterministic result into spurious regression results, un-interpretable student t-values and other statistics have too high goodness of fit which make results difficult to evaluate. The remedy will be to stationarise the data by differencing. Differencing, however, leads to loss of long run properties as the model in difference has no long run solution. This will be remedied by measuring variables in the level form while maintaining stationarity with short run (impact effect) and long run properties simultaneously incorporated by the use of the error correction mechanism (ECM) or feedback mechanism in the Cointergration analysis.

Cointergration solves the problem associated with the loss of information associated with detrending or by the attempts to address the stationarity through differencing as in the growth rate models such as used by (Odedokun, 1993). It rejects spurious regression results but at the same time accepts correlation between non-stationary series where correlation is structural rather than spurious. This Cointergration analysis was developed by among others Granger, (1986)and Engle & Granger, (1987). Non-stationary variables are said to be cointergrated if they have a long run relationship amongst themselves in which deviations from their long run path are stationary that is two or more variables could be non-stationary but have their differences (or their linear combination) stationary. By definition, therefore variables are said to be cointergrated if a linear combination of these variables assumed lower order of Cointergration. The variables are themselves non-stationary but must be of the same order of integration individually. It is their linear combination which is integrated of a lower order. Where Cointergration is rejected, then there will be no long run relationship between the non-stationary series and thus there will be no information in α coefficient in equation 3.3

below. Imposition of ECM, will be rejected by the data and the solution will be to specify the model in another form in which no long run relationship appears.

If $Y_t \sim I(a)$ and $X_t \sim I(b)$ and their linear combination is

$\varepsilon_t = Y_t - \alpha X_t I(a-b)$ then Y_t and X_t are cointegrated. This can be specified as;

$Y_t = \alpha X_t + \varepsilon_t$..... (iv)

Where

Y_t is the regress and X_t is the regressor, α is the parameter to be estimated and ε is the mean-zero error term.

If Y_t and X_t are non –stationary but their differences (ΔY*and* ΔXt) are stationary, then only the short run effect will be captured by running a regression on the following equation.

$\Delta Y_t = \alpha \Delta X_t + \varepsilon_t$…… (v)

But if in (3.3), $Y_t - \alpha X_t$ is stationary, then their lag ($Y_{t-1} - \alpha X_{t-1}$) can be augmented into (3.4) as an explanatory variable such that we have an ECM_t represented by

$\Delta Y = \alpha \Delta X_t + ø\ (Y_{t-1} - \alpha\ X_{t-1}) + \varepsilon_t$ …… (vi)

Equation (3.5) simultaneously incorporates both the short run and the long run solution and has an error correlation mechanism when ø is negative.

3.6.3 Granger-Causality

A general specification of the Granger causality test in a bivariate (X, Y) context can be expressed as:

$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \ldots\ldots + \alpha_i Y_{t-i} + \beta_1 X_{t-1} + \ldots\ldots\ldots \beta_i X_{t-i} + \mu$ …… (vii)

$X_t = \alpha_0 + \alpha_1 X_{t-1} + \ldots\ldots + \alpha_i X_{t-i} + \beta_1 Y_{t-1} + \ldots\ldots\ldots \beta_i Y_{t-i} + \mu$ …….. (viii)

In the model, the subscripts denote time periods and μ is a white noise error. The constant parameter α represents the constant growth rate of Y in the equation (3.6) and X in the equation (3.7) and thus the trend in these variables can be interpreted as general

movements of Cointergration between X and Y that follows the unit root process. We can obtain two tests from this analysis: the first examines the null hypothesis that the X does not Granger-cause Y and the second test examines the null hypothesis that the Y does not Granger-cause X. If we fail to reject the former null hypothesis and reject the latter, then we conclude that X changes are Granger-caused by a change in Y (Gul and Ekina, 2006). Unidirectional causality will occur between two variables if either null hypothesis of equation (3.6) or (3.7) is rejected. Bidirectional causality exists if both null hypotheses are rejected and no causality exists if neither null hypothesis of equation (3.6) nor (3.7) is rejected Duasa(2007).

3.7 Estimation Techniques

The estimation process shall involve determining what variables fit in the model to describe the relationship between the variables. Vector Error Correction Model analysis, impulse response functions and variance decomposition analysis are undertaken.

3.7.1 Vector Error Correction Model (VECM) analysis.

Based on Fu, Taylor and Yucel (2003) and Sims (1972 and Sims (1980), the study adopted a VECM model to estimate simultaneous shocks to more than one variable and used that to investigate unexpected and equivalent structural shocks.

Vector Error Correction Model (VECM) analysis was employed to achieve the three objectives of the study. These objectives were: find out the relationship between inflation rate and stock market return among insurance companies listed on the NSE; find out the relationship between exchange rate and stock market return among insurance companies listed on the NSE; find out the relationship between interest rate and stock market return among insurance companies listed on the NSE.

Use of VECM in the study was on the justification that it is a model that can test for both long run and short run effects. The study mainly considered macroeconomic variables in

the VECM since the main focus was on the macroeconomic variables and its effects on insurance stock market index.

The general vector error correction model with deterministic trend is given as follows

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta y_{t-i} + \mu + \varepsilon_t \quad \text{.....(ix)}$$

Where, y_t is a (n x 1) vector of the n variables of interest, i.e. non-oil export in real terms, real effective exchange rate, real non-oil GDP, μ is a (n x 1) vector of constants, Γ represents a (n x (k-1)) matrix of short-run coefficients, ε_t denotes a (n x 1) vector of white noise residuals, and Π is a (n x n) coefficient matrix. If the matrix Π has reduced rank ($0 < r < n$), it can be split into a (n x r) matrix of loading coefficients α , and a (n x r) matrix of co-integrating vectors β . The former indicates the importance of the co-integration relationships in the individual equations of the system and of the speed of adjustment to disequilibrium, while the latter represents the long-term equilibrium relationship, so that $\Pi = \alpha\beta'$. k is number of lags, t denotes time and Δ is a difference operator.

3.7.2 Impulse Response Analysis

Stock (2001) argued that impulse responses are geared towards estimating the link between the current and past error term of the variable under investigation. Impulse response analysis relates the current value of the error-term to the future values of X_t or similarly, the current and past values of the error-term to the current values of X_t. The analysis enables one to investigate the effect of one time shock to one of the innovations on the current and future values of the endogenous variable.

3.7.3 Variance Decomposition

Having investigated the effect of one time shock to one of the innovations on the current and future values of the endogenous variable, the variance decomposition separates the variation

in an endogenous variable into the VECM components. Odour (2008) posited that forecast error variance decomposition technique is appropriate if the study seeks to determine proportion of variance which was due to its own unique as well as other identified shock since it allocates weights to every shock identified in the system.

In the short run, the shocks due to own are high but the variance due to other variables increase with time horizon.

This study conducted variance decomposition to determine the proportions of the shocks in insurance stock index that were due to lagging macroeconomic variables and thus determine their role in influencing insurance stock market returns in Kenya.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 Introduction

The current chapter shows the results of the findings. Initially, the descriptive analysis of the study variables is presented followed by stationarity test then Johansen Co integration test and finally the error correction model.

4.2 Descriptive Analysis

Descriptive analysis shows that the average insurance index was 109.72 with a minimum index of 73.7 and a maximum of 173.4. The insurance index was normally distributed since the p value for Jarque-Berra test was 0.089. The average interest rate was 8.278%, there was no wide deviation on interest rate though the highest rate was 20.56%. In addition, the study showed the average exchange rate of Kenyan shilling to dollar was 83.209; the Kenyan currency had a wide deviation since it weakened from 101.27 to 74.739. The prevailing inflation rate averaged at 9.512% with a maximum of 17.07%. There was a wide variation on inflation rate as accounted for by 4.6%.

TABLE 4

Descriptive Statistics

	Insurance Index	Interest rate	Exchange rate	Inflation rate
Mean	109.720	8.278	83.209	9.512
Median	99.954	7.660	83.983	8.420
Maximum	173.357	20.560	101.270	17.070
Minimum	73.707	1.600	74.739	3.930
Std. Dev.	25.876	4.435	5.280	4.600
Skewness	0.622	0.811	0.786	0.336
Kurtosis	2.378	3.664	4.274	1.571
Jarque-Bera	4.832	7.671	10.235	6.233
Probability	0.089	0.022	0.006	0.044
Sum	6583.176	496.650	4992.564	570.690
Sum Sq. Dev.	39503.655	1160.697	1644.742	1248.225

4.3 Regression Analysis

The study hypothesis that insurance companies stock returns is a function of inflation rate, exchange rate, and interest rate which can be modeled a regression model as follows:

$$Y_t = \beta_0 + \beta_1 x_{1,t} + \beta_2 x_{2,t} + \beta_3 x_{3,t} + \acute{\varepsilon}_{,t} \quad \text{.....(4.1)}$$

Where:

Y= Insurance company share return, x_1= Inflation rate, x_2= Foreign exchange rate, x_3= Interest rate, $\acute{\varepsilon}_{i,t}$= error term

TABLE 5

Regression Analysis

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Dependent Variable	Insurance Stock Market Index			
C	178.1470	43.1074	4.1326	0.0001
Interest Rate	-4.6777	0.6665	-7.0179	0.0000
Inflation Rate	0.4262	0.7725	0.5518	0.5833
Exchange Rate	-0.3301	0.5249	-0.6288	0.5320
R-squared	0.6150	Mean dependent var		109.7196
Adjusted R-squared	0.5944	S.D. dependent var		25.8757
S.E. of regression	16.4791	Akaike info criterion		8.5064
Sum squared resid	15207.4494	Schwarz criterion		8.6460
Log likelihood	-251.1922	Hannan-Quinn criter.		8.5610
F-statistic	29.8228	Durbin-Watson stat		0.2762
Prob(F-statistic)	0.0000			

From table 4.2 above, we observe that the inflation rate and exchange rate have an insignificant effect on the insurance stock market index. Only the interest rate has a significant though negative effect on the insurance stock market index. This contradicts empirical evidence from the previous literature as discussed in chapter two.

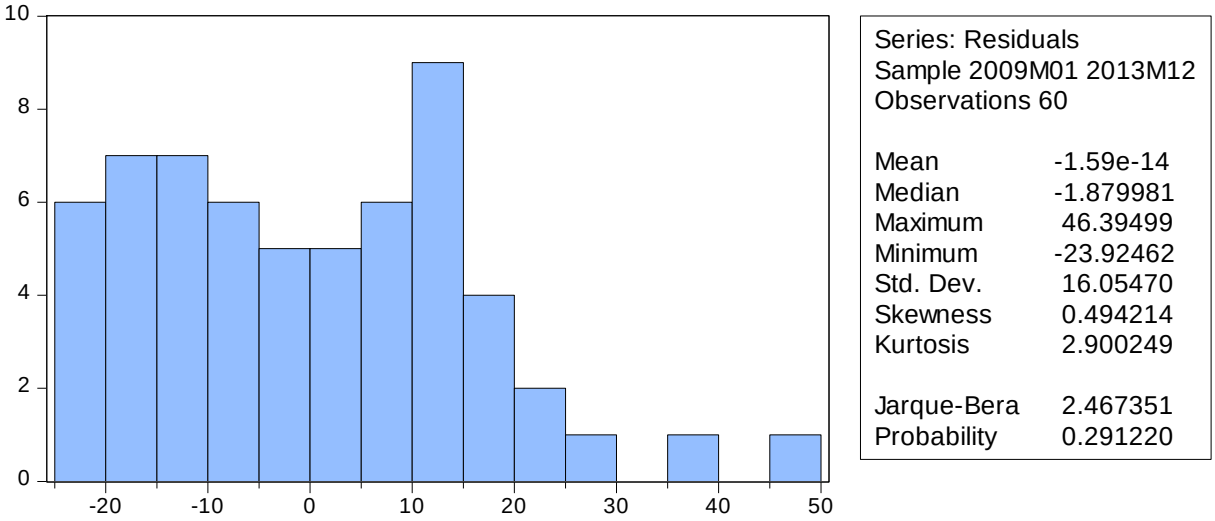
We therefore proceed to discuss the aptness of the model by testing for the classical linear models assumptions that: there is a linear relationship between the dependent variable and the independent variables, the error terms are random and normally distributed, the residuals are homoscedastic and there is no serial correlation among the residuals.

Scatter plots are used to test the linearity assumptions. As shown in Figure 4.2 in the appendix, the scatter plot depicts some level of linearity between the insurance stock market index and inflation rate and interest rate. However, there is no linearity between the insurance stock market index and exchange rate. This is also depicted in the correlation matrix in Table 4.3 in the appendix.

Histogram bars are used to test for normality of the residuals. Results in Figure 4.2 depicted normality of the residuals. The Jarque Bera statistics also depict normality of the residuals.

FIGURE 2

Normality Test



To test for the assumption of randomness of the error terms, we used a residual plot for the fitted values and the residuals. The residual plot shown in figure 4.3 exhibited a pattern which was an indication that the residuals were not random.

To test for serial correlation of the residuals, Breusch-Godfrey Serial Correlation LM Testis performed. As shown in Table 4.3 below, at 5% level of significance, the null hypothesis that there is no serial correlation is rejected ($p<0.05$). We therefore accept the alternative hypothesis that there is autocorrelation.

TABLE 6

Breusch-Godfrey Serial Correlation LM Test

F-statistic	135.6174	Prob. F(1,55)	0.000
Obs*R-squared	42.68783	Prob. Chi-Square(1)	0.000

Lastly, we tested for homoscedasticity of the residuals using the White test. As shown in Table 4.4 below, at 5% level of significance, the null hypothesis that there is no Heteroskedasticity is rejected ($p<0.05$). We therefore accept the alternative hypothesis that there is Heteroskedasticity.

TABLE 7

Heteroskedasticity White Test

F-statistic	2.621244	Prob. F(9,50)	0.0145
Obs*R-squared	19.23426	Prob. Chi-Square(9)	0.0233
Scaled explained SS	15.9195	Prob. Chi-Square(9)	0.0686

With the above inadequacies of the data, we therefore resolve to using time series analysis. The data also being of a time series nature, it is more appropriate to use the time series analysis.

4.4 Time Series Analysis

Stationarity tests, Cointegration tests and error correction mechanism are therefore carried out to analyse the time series properties of the data.

4.4.1 Stationarity Test

Both Augmented Dickey Fuller Test (ADF) and Phillip Perrons were used as the test for checking the stationary level of the variables. Results in Table 4.5 shows that none of the variables were stationary at levels thus the null hypothesis which stipulated the presence of unit root was accepted. Since insurance return, exchange rate, inflation rate and interest rate all were not stationary it was paramount to difference in the first order as shown in Table 4.5.

TABLE 8

Unit Root Test at Levels

Variable	Test at levels	ADF Test		
		T statistic	Critical Value at 5%	P value
Insurance Index	Constant	-0.1660	-2.9117	0.9365
	Constant and Trend	-0.8521	-3.4878	0.9543
Inflation rate	Constant	-8.6811	-2.9126	0.0000
	Constant and Trend	-8.3806	-3.4892	0.0000
Exchange rate	Constant	-2.0sza181	-2.9126	0.2785
	Constant and Trend	-2.6776	-3.4892	0.2495
Interest rate	Constant	-2.2729	-2.9145	0.1841
	Constant and Trend	-2.4757	-3.4921	0.3386

Unit root test after first difference were tabulated in Table 4.6. Results showed that all the variables except inflation rate were stationary. It was therefore imperative to difference in the second order as shown in Table 4.7.

TABLE 9

Unit Root Test at First Difference

Variable	Test at levels	ADF Test		
		T statistic	Critical Value at 5%	P value
Insurance Index	Constant	-6.3238	-2.9126	0.0000
	Constant and Trend	-6.3608	-3.4892	0.0000
Inflation rate	Constant	-3.6831	-2.9166	0.0071
	Constant and Trend	-3.6212	-3.4953	0.0373
Exchange rate	Constant	-5.4029	-2.9126	0.0000
	Constant and Trend	-5.3543	-3.4892	0.0002
Interest rate	Constant	-2.8993	-2.9145	0.0518
	Constant and Trend	-2.8674	-3.4921	0.1807

Unit root test after second difference were tabulated in Table 4.7. Results showed that insurance return, exchange rate, inflation rate and interest rate were stationary after the second difference. Therefore, it can be concluded that insurance return, exchange rate, inflation rate and interest rate all were integrated of order (2).

TABLE 10

Unit Root Test at Second Difference

Variable	Test at levels	ADF Test		
		T statistic	Critical Value at 5%	P value
Insurance Index	Constant	-8.6988	-2.9145	0.0000
	Constant and Trend	-8.6154	-3.4921	0.0000
Inflation rate	Constant	-3.6179	-2.9135	0.0083
	Constant and Trend	-3.6089	-3.4907	0.0329
Exchange rate	Constant	-8.3931	-2.9145	0.0000
	Constant and Trend	-8.3146	-3.4921	0.0000
Interest rate	Constant	-10.7295	-2.9145	0.0000
	Constant and Trend	-10.6314	-3.4921	0.0000

4.4.2 Lag Selection

Prior to conducting the Cointergration test we first examined the optimal number of lags as shown in Table 4.8. Enders (1995) as cited in Gitahi *et al*, (2013) argued that it is appropriate to determine the optimal number of lags as such to eliminate the chances of error terms misspecification. Although, there are different means of examining the optimal number of lags for example LR, FPE, AIC, SC and HQ, the optimal decision is to choose the model with the lowest information criterion. Results in Table 4.8 revealed conflicting results since both SC and HQ optimal lags was 2 while LR, FPE and AIC had the lowest lag as 3.

TABLE 11

Results for Lag Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-687.68	NA	985000.5	25.15189	25.29788	25.20834
1	-436.89	455.9759	193.3875	16.61419	17.34413	16.89646
2	-337.88	165.6106	9.546231	13.59578	14.90967*	14.10387*
3	-320.31	26.83396*	9.240799*	13.53869*	15.43654	14.2726
4	-306.04	19.72076	10.3153	13.60154	16.08334	14.56127
5	-289.76	20.12521	11.05499	13.59144	16.65719	14.77699

* 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

Because of this conflict it was necessary to fit a Correlogram of residuals with an optimal lag of 1. Lag 1 was selected because the Correlograms are statistically insignificant. Our series Correlogram was presented in Figure 4 in the appendix.

4.4.3 Cointergration Test

Since all the variables were integrated of order two (2) it was necessary to carry out test to examine whether the variables were cointergrated. Two time series variables are said to have tendencies of drifting from each other if they are non-stationary and cointergrated though they will always tend to remain proximate to each other. In the current study Johansen Cointergration was used, the choice was guided by the fact that it's a multivariate autoregressive approach and it has chances of dealing with more than one cointergrating factors. Moreover, the approach separates long run equilibrium relationships from short term dynamics. In this test the Trace statistics was used to test the significance of estimates of Eigen values.

The Trace statistics as shown in Table 4.10 below indicated one cointergrating equation at 5% level of significance. This implied there was a long run relationship between the variables under investigation.

An error correction model is then used to determine the short run equilibrium between the variables.

TABLE 12

Johansen Cointergration Test

Trend assumption: No deterministic trend				
Series: Insurance index exchange rate inflation rate and interest rate				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.594967	86.65029	54.07904	0.0000
At most 1	0.349060	34.23061	35.19275	0.0632

At most 2	0.110516	9.329008	20.26184	0.7052
At most 3	0.042788	2.536387	9.164546	0.6703
Trace test indicates 1 cointegratingeqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

4.5 Vector Error Correction Model (VECM)

After establishing that all the data was time series I(2), we can fit VECM or VAR models on differentiated series to model the data. The most appropriate model will be determined by the presence or absence of Cointergration. If the series is cointergrated then fitting VECM will be the most appropriate as such to capture both short run and long run relationship between the variables being examined.

Johansen Cointergration results showed that there was a long run relationship between the variables under examination therefore the most appropriate model is VECM with differentials.

Results for VECM Model

Since the stock return, inflation rate, interest rate and exchange rate were cointergrated, VECM was estimated and the results tabulated as shown in Table 4.14 in the appendix.

Based on the VECM estimates, the system equation can be presented in the following way:

D(ISI) = - 0.0125145748629*(ISI(-1) + 1.92601507989*IT(-1) + 16.4980466973*IF(-1) - 3.39789500684*ER(-1) + 0.775274312539) + 0.087286738584*D(ISI(-1)) - 0.712237624297*D(IT(-1)) - 2.54740512636*D(IF(-1)) - 0.403187055635*D(ER(-1)) + 0.00968025316111

The error correction part is used to test the long run and short relationship. The error correction term has a negative sign and is insignificant at 5 percent. This implies that there is no long run causality of the variables to insurance index.

To test for the short run effect, we use the Wald test using the coefficients c(2),c(3)c(4) and c(5). The Chi Square probability is 0.1324 and therefore we cannot reject

the null hypothesis that there is no short run causality. There is therefore no short run causality of the three macroeconomic variables on the insurance index.

4.6 Post estimation Analysis

Post estimation analysis was carried out to evaluate the model robustness for estimating the relationship between macroeconomic variables and insurance return. Autocorrelation for the residuals was examined using Langrage multiplier test (LM), stability condition was tested since after fitting VECM the covariance matrix should be stationary. The impulse response for stable VECM has valid interpretations. Results in Table 4.11 shows that the error term was uncorrelated at lag order 1.

TABLE 13
Autocorrelation

Lags	LM-Stat	Prob
1	26.31	0.0497
H_o: No serial correlation at lag order		

Stability of Variance

Polynomial stability condition was satisfied since none of the modulus coefficient was greater than 1 as shown in Table 4.12 below..

TABLE 14

Roots Characteristics of Polynomial

Root	**Modulus**
0.962592 - 0.176877i	0.978708
0.962592 + 0.176877i	0.978708
0.952393	0.952393
0.630965 - 0.273246i	0.687591
0.630965 + 0.273246i	0.687591
0.458982 - 0.134343i	0.478239
0.458982 + 0.134343i	0.478239
-0.07086	0.070863

4.7 Impulse Response Analysis

The VECM coefficients result were used to estimate the impulse responses. Stock (2001) argued that impulse responses are geared towards estimating the link between the current and past error term of the variable under investigation. Mores so VECM estimated results were inputs in generation of impulse responses and variance decomposition which were used to measure the effect of interest rate, inflation rate and exchange rate on insurance stock return. Gitahi *et al* (2014) argued that through impulse responses the study can trace the effect of one standard deviation shock to changes on current or future values of all endogenous variables in the equation.

Table 4.15 shows impulse responses of the insurance stock market index over the 60 period horizons, to one standard /deviation shock of each of the lagging macroeconomic variable in the VAR model. From the table, we note that only interest rate has a significant effect on the insurance index. Exchange rate and inflation didn't have a significant effect.

4.8 Variance Decomposition

Since the impulse response functions traced the effect of shocks to each endogenous variable from the others in VECM, on the other hand variance decomposition separates the variation of endogenous variables into the VECM components. The study carried out variance decomposition to determine the proportions of the shocks in the insurance return that were accredited to interest rate, exchange rate and inflation rate and therefore established their relative importance in determining insurance return among listed companies in Kenya.

Table 4.13 shows decomposition of the variation in insurance stock index at selected periods over 60^{th} monthly period.

TABLE 15

Variance Decomposition of Insurance Stock Index

Variance Decomposition of ISI:					
Period	S.E.	ISI	IT	IF	ER
1	0.086692	100.0000	0.000000	0.000000	0.000000
6	0.248183	96.67180	0.847505	1.439354	1.041344
12	0.392286	94.00274	0.490663	2.630275	2.876324
18	0.526359	92.27587	0.285415	2.187345	5.251370
24	0.633013	91.70641	0.221089	1.605910	6.466590
30	0.709719	91.92854	0.178221	1.297538	6.595698
36	0.771035	92.29427	0.159694	1.175452	6.370585
42	0.830460	92.46208	0.145169	1.170271	6.222481
48	0.891697	92.44583	0.126641	1.156289	6.271241
54	0.950936	92.39990	0.111589	1.094085	6.394422
60	1.004503	92.42391	0.100074	1.026638	6.449375

The full results of the Variance Decomposition Analysis of insurance stock index are given in Table 4.16 in the appendix. From the results we see that much variation in insurance stock index is due to its own shock at 100 percent in the first month. The variation of own shocks in insurance stock index reduced to 96.67180 in the sixth month and even to a lower level as the forecast period increased. In the 60^{th} month, the variation of own shocks in insurance stock index was 92.42391. It was also noted that the variation in insurance stock index due to other variables is zero in the first month signifying that on impact, the variations are solely on own shock.

The table also shows that of the three lagging macroeconomic variables, exchange rate had the highest impact on the insurance stock market return generally. This was followed by inflation rate. Interest rate had the least impact on the insurance stock market return.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The current chapter summarizes the study from which conclusions and policy implications of the results are drawn as well as areas of future research.

5.2 Discussions

The risk return trade-off have been of concern among various scholars since investors have to be always assured of their returns since this will increase the level of investors' confidence. Scholars have shown significant relationship between macroeconomic indicators and stock returns though limited studies have been done in Kenya in relation to insurance companies listed. Since independence, the Kenyan government has endeavored to promote investment through various legislation, development of economic policies aimed at strengthening the currency, provision of financial services among investors who are interested in investing in specific areas among other policy enactments.

Augmented Dickey Fuller Test (ADF) was used as the test for checking the stationary level of the insurance stock market return and the three lagging macroeconomic variables. Results showed that none of the variables under study were stationary at levels. Since insurance return, exchange rate, inflation rate and interest rate all were not stationary it was paramount to difference in the first order. Unit root test after first difference showed that all the variables except inflation rate were stationary. It was therefore imperative to difference in the second order. Results showed that insurance return, exchange rate, inflation rate and interest rate were stationary after the second difference. Therefore, it can be concluded that insurance return, exchange rate, inflation rate and interest rate all were integrated of order (2).

Johansen Cointergration was used, the choice was guided by the fact that it's a multivariate autoregressive approach and it has chances of dealing with more than one cointergrating factors. Moreover, the approach separates long run equilibrium relationships from short term dynamics. In this test the Trace statistics was used to test the significance of estimates of Eigen values. The results of the study showed there was one Cointergration equation between insurance return, exchange rate, inflation rate and interest rate. The Trace statistics indicated one cointergrating equation at 5% level of significance. This implied there was a long run relationship between the variables under investigation.

Vector error correction model was used to test for the short run equilibrium. To achieve the objectives of the study, the results were analyzed using impulse response functions and variance decomposition analysis. Stock (2001) argued that impulse responses are geared towards estimating the link between the current and past error term of the variable under investigation. Gitahi *et al* (2014) argued that through impulse responses, the study can trace the effect of one standard deviation shock to changes on current or future values of all endogenous variables in the equation.

To achieve the first objective of the study which was to find out the relationship between inflation rate and stock market return of insurance companies listed in the NSE, we regressed insurance return against inflation rate. Results of the impulse response analysis showed that there was no significant of inflation on insurance return. These findings supported the empirical findings of insignificant relationship between the insurance index and inflation as reported in Malaysia. However, it contrasted with Geetha*et al* (2011) who found a long run significant relationship between stock return and inflation rate among companies listed in China and Malaysia. Further, the findings contrasted Omotor (2010) who found a positive relationship in Nigeria.

The second objective sought to find out the relationship between exchange rate and stock market returnof insurance companies listed in the NSE. To achieve this, VECM was used to examine the relationship. The impulse response revealed that the exchange rate had no significant effect on insurance return index. These findings contrasted Phylaktis and Ravazzalo (2005) who found a positive significant relationship between foreign exchange and US stock market. Although, there was no long run relationship,Tabak (2005) found significant granger causality in Brazil. The results differed with studies carried out in US stock market since the economy is developed and is more dependent on exporting rather than Kenyan economy which imports a lot thus more dependent on exchange rate which can influence performance negatively.

Thirdly, the study also sought to find out the relationship between interest rate and stock market return of insurance companies listed in the NSE. ADF revealed that interest rate was stationary at the second difference. Impulse response analysis revealed that interest rate had a negative influence on insurance stock index. These findings were in agreement with Hsing (2004) who found a negative relationship between stock return and interest rate. Similarly, Zodan (2005) argued that there is a negative and significant relationship between interest rate and stock return. Alman and Udin (2009) reported similar results on the relationship between interest and stock return.

5.3 Conclusion and Recommendation

Vector Error Correction model (VECM) analysis was employed to achieve the three objectives of the study. These objectives were to find out the relationship between inflation rate and stock market return ofinsurance companies listed in the NSE; find out the relationship between exchange rate and stock market return ofinsurance companies listed in

the NSE; and to find out the relationship between interest rate and stock market return of insurance companies listed in the NSE.

The study concludes that there only exists a relationship between interest rate and the insurance stock market return. Inflation rate and exchange rate has no effect on insurance stock market return.

The government has a pivotal role on the trio macroeconomic indicators though exchange rate and interest rate ought to be freely determined depending on the forces of demand and supply. The government can influence the market interest through the use of its monetary and fiscal policies. It can also influence strengthen or weaken the currency depending on monetary policies taken especially when the currency weakens. Since an increase in interest rate decreased insurance stock return, both short and long run policies should be employed to manage the fluctuations in the interest rate which will increase investors confidence and consequently promote economic development.

An increase in the interest rate implies a decrease in the required rate of return in the market. Among the many reasons for the decrease may be a vibrant economy which promises better returns to the fixed income market. This therefore sends a signal to the stock traders to shift their investments to fixed income which thus leads to a decrease in the market return.

5.4 Policy Implications

A mature stock market is an indicator of the health of an economy and a forecast of a country's economic health. It is also a critical parameter for both local and international investors.

The existence of a relationship between the interest rate and the insurance stock market returns underlines the role that the policy makers in the government as well as insurance sector need to factor in their decision making.

The results and conclusion of this study will therefore assist the entire interested group to decide managerial, operational, sustainable growth decision efficiently. It will also inform investors on strategies to make maximum returns from their investment in stock market based on the economic trends as informed by the lagging macroeconomic indicators. Insurance and capital markets regulators will also formulate policies and decisions for ensuring and creating smooth trading and investment atmosphere in the stock marketbased on their experience and knowledge on predictable stock market price trends.

The government through its regulatory bodies ought to formulate policies that will minimize the volatility of the lagging macroeconomic factors. Policies to manage the volatility of these variables will help foster both local and global investors in the insurance stocks.

5.5 Areas of Future Research

Future research should adopt the use of primary data as such to examine the qualitative influencers of insurance return among quoted insurance companies. From this study it will be appropriate to retrieve the first hand information from investors on their perception on the relationship between lagging macroeconomic indicators and stock return among listed insurance companies.

Secondly the study suggest since they are efforts for economic integration a similar study sought to be carried among insurance companies listed in securities exchanges among the member countries. This is because an opening of common market will create avenues for

arbitrage profits especially on currency transactions more so there are chances of seeking alternative interest rate among member countries as well as enjoying on the inflation rate mismatch.

Interestingly the government have other roles when developing its polices for example the government policy on poverty reduction, income redistribution, attainment of fiscal and monetary stability may not be friendly to investors and consequently there is need to establish the moderating effect of government role in relation to lagging macroeconomic indicators on insurance return among quoted insurance companies.

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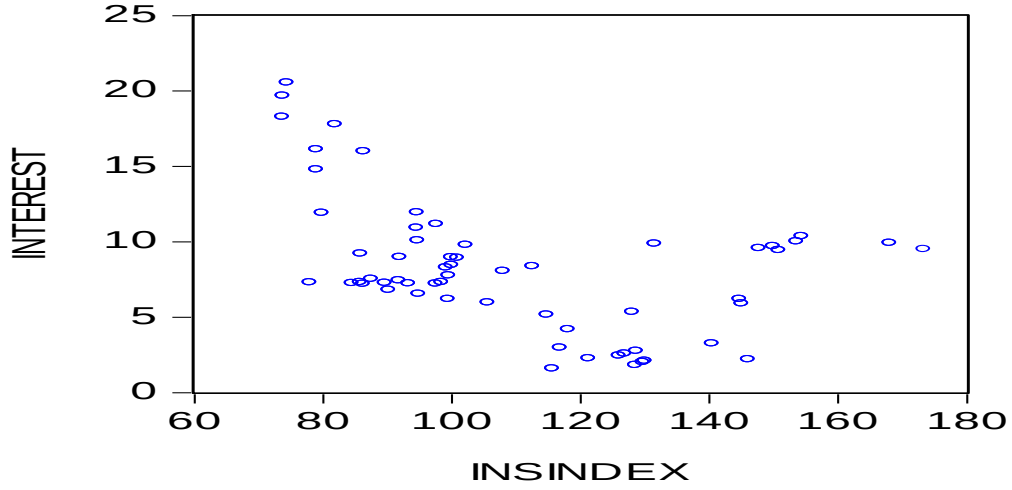
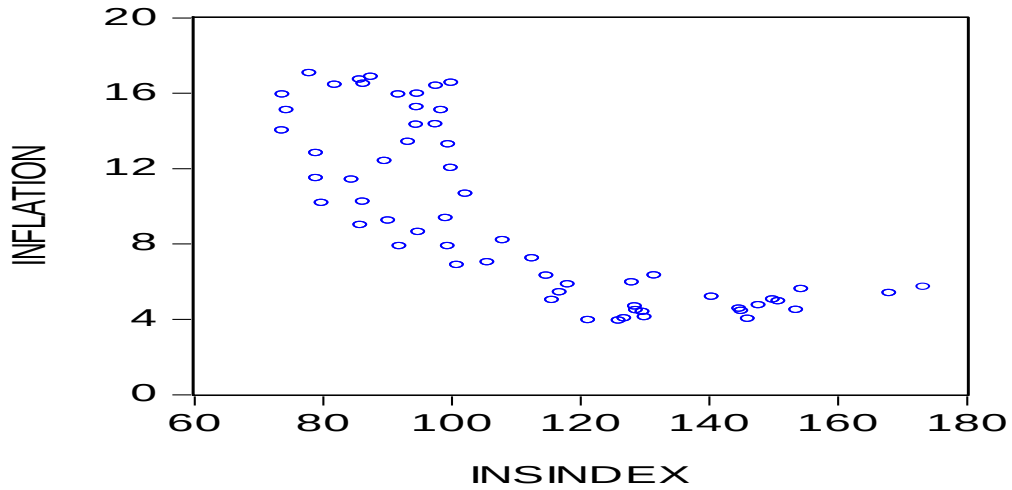
APPENDICES
Appendix I: Figures

Figure 3
Linearity Test





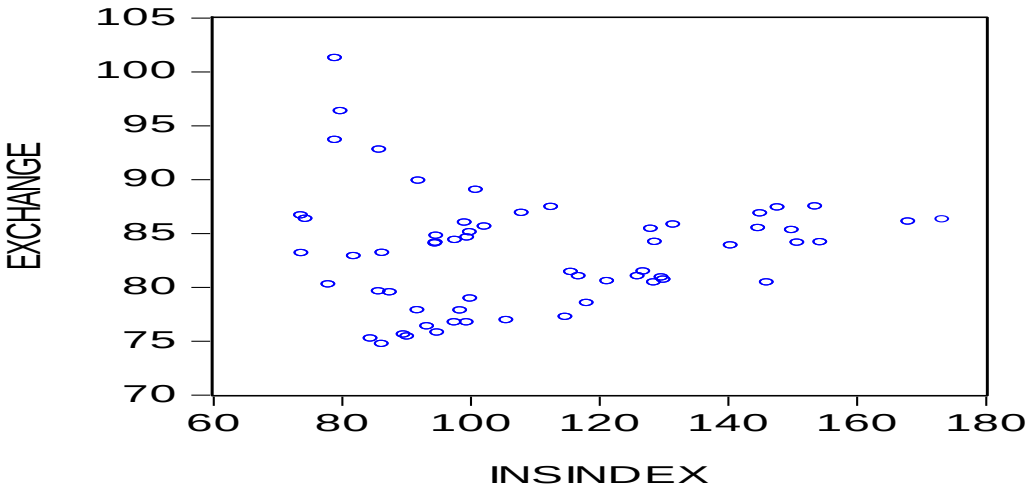


FIGURE 4

Correlogram of Residual for VAR Lag Selection

Autocorrelations with 2 Std.Err. Bounds

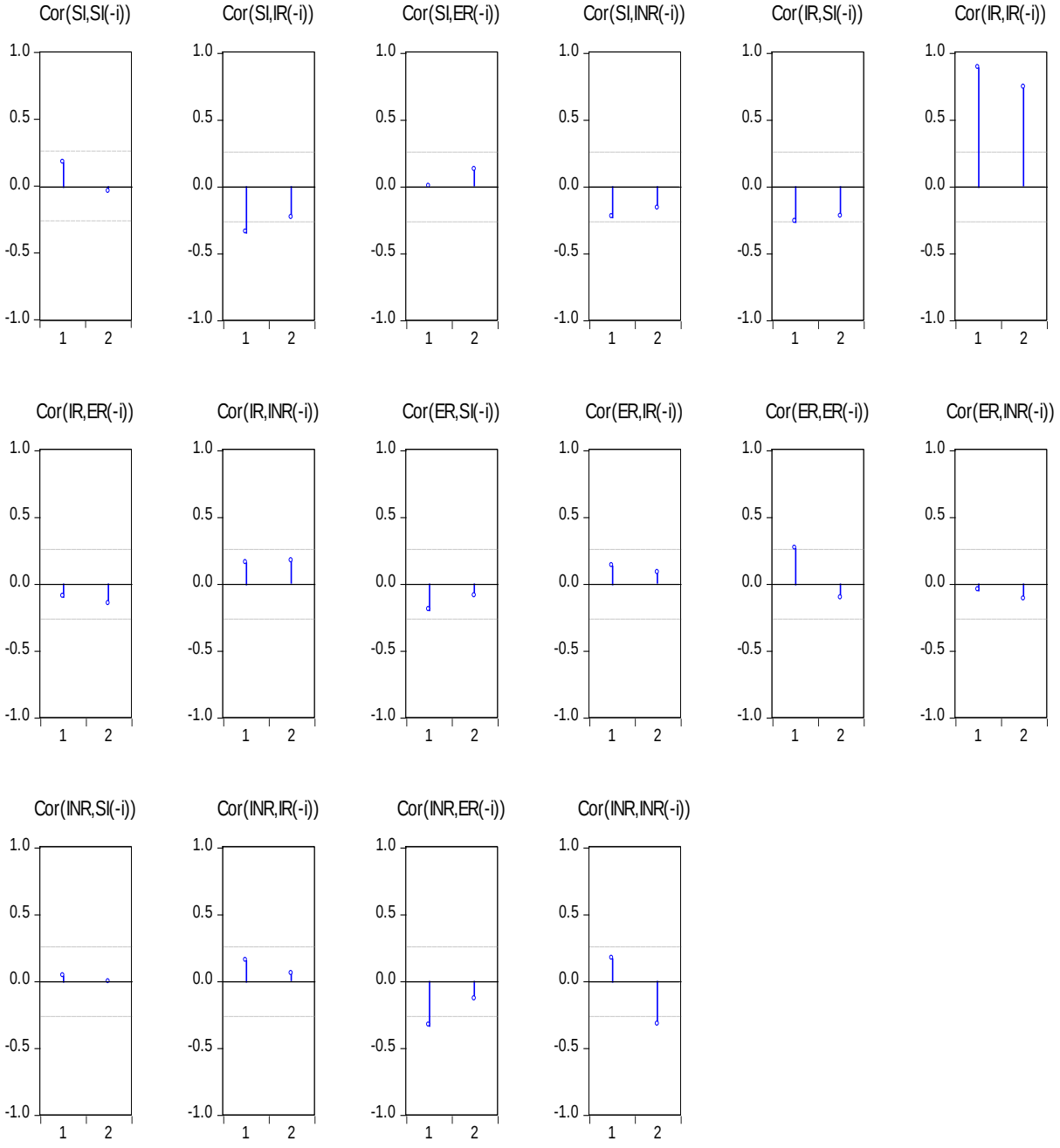
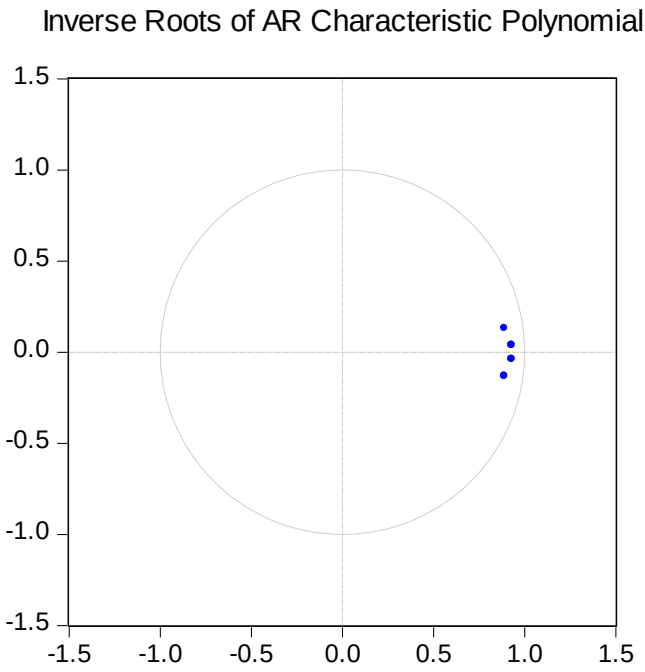


Figure 5 Inverse Roots of AR Characteristic Polynomial



APPENDIX II: TABLES

Table 16

Vector Autoregressive Model

Dependent Variable: D(ISI)
Method: Least Squares

Sample (adjusted): 2009M03 2013M12
Included observations: 58 after adjustments
D(ISI) = C(1)*(ISI(-1) + 1.92601507989*IT(-1) + 16.4980466973*IF(-1) - 3.39789500684*ER(-1) + 0.775274312539) + C(2)*D(ISI(-1)) + C(3)*D(IT(-1)) + C(4)*D(IF(-1)) + C(5)*D(ER(-1)) + C(6)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.012515	0.019260	-0.649770	0.5187
C(2)	0.087287	0.138005	0.632492	0.5298
C(3)	-0.712238	0.833888	-0.854117	0.3970
C(4)	-2.547405	1.683370	-1.513277	0.1363
C(5)	-0.403187	0.504265	-0.799553	0.4276
C(6)	0.009680	0.011878	0.814979	0.4188

R-squared	0.109941	Mean dependent var	0.014798
Adjusted R-squared	0.024359	S.D. dependent var	0.087767
S.E. of regression	0.086692	Akaike info criterion	-1.955220
Sum squared resid	0.390803	Schwarz criterion	-1.742071
Log likelihood	62.70139	Hannan-Quinn criter.	-1.872194
F-statistic	1.284620	Durbin-Watson stat	1.998589
Prob(F-statistic)	0.284715		

Wald Test for Short Run Equilibrium

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	1.868921	(3, 52)	0.1463
Chi-square	5.606764	3	0.1324

Null Hypothesis: C(2)=C(3)=C(4)=C(5)
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2) - C(5)	0.490474	0.492221
C(3) - C(5)	-0.309051	0.922467
C(4) - C(5)	-2.144218	1.708581

Restrictions are linear in coefficients.

Table 17

Impulse Response of Insurance Stock Index

Response of ISI:				
Period	**ISI**	**IT**	**IF**	**ER**
1	0.086465	0.000000	0.000000	0.000000
2	0.096809	-0.008364	-0.005392	-0.007318
3	0.100308	-0.009400	-0.009755	-0.009135
4	0.102375	-0.009420	-0.013607	-0.010313
5	0.104737	-0.009068	-0.016973	-0.011834
6	0.107679	-0.008425	-0.019820	-0.013938
7	0.111147	-0.007506	-0.022104	-0.016603
8	0.114999	-0.006347	-0.023788	-0.019721
9	0.119069	-0.004997	-0.024858	-0.023155
10	0.123192	-0.003518	-0.025321	-0.026756
11	0.127212	-0.001973	-0.025204	-0.030380
12	0.130987	-0.000423	-0.024556	-0.033891
13	0.134396	0.001074	-0.023439	-0.037168
14	0.137339	0.002467	-0.021930	-0.040106
15	0.139742	0.003711	-0.020115	-0.042622
16	0.141555	0.004771	-0.018082	-0.044653
17	0.142756	0.005622	-0.015924	-0.046160
18	0.143344	0.006248	-0.013730	-0.047127
19	0.143345	0.006642	-0.011584	-0.047557
20	0.142801	0.006807	-0.009563	-0.047474
21	0.141773	0.006754	-0.007731	-0.046920
22	0.140334	0.006501	-0.006142	-0.045950
23	0.138570	0.006071	-0.004839	-0.044631
24	0.136569	0.005495	-0.003847	-0.043037
25	0.134423	0.004804	-0.003180	-0.041249
26	0.132223	0.004033	-0.002839	-0.039346
27	0.130054	0.003216	-0.002813	-0.037409
28	0.127994	0.002386	-0.003079	-0.035511
29	0.126112	0.001576	-0.003605	-0.033720
30	0.124464	0.000814	-0.004354	-0.032094
31	0.123095	0.000125	-0.005279	-0.030682
32	0.122033	-0.000471	-0.006335	-0.029520
33	0.121296	-0.000959	-0.007471	-0.028632
34	0.120887	-0.001329	-0.008641	-0.028031
35	0.120796	-0.001575	-0.009798	-0.027719
36	0.121004	-0.001699	-0.010900	-0.027684

37	0.121481	-0.001704	-0.011910	-0.027909
38	0.122189	-0.001599	-0.012798	-0.028365
39	0.123084	-0.001395	-0.013540	-0.029018
40	0.124119	-0.001109	-0.014120	-0.029830
41	0.125247	-0.000757	-0.014527	-0.030758
42	0.126417	-0.000356	-0.014759	-0.031759
43	0.127584	7.47E-05	-0.014821	-0.032792
44	0.128704	0.000517	-0.014723	-0.033815
45	0.129739	0.000954	-0.014481	-0.034791
46	0.130658	0.001369	-0.014115	-0.035687
47	0.131434	0.001750	-0.013646	-0.036476
48	0.132050	0.002083	-0.013100	-0.037137
49	0.132494	0.002361	-0.012504	-0.037654
50	0.132764	0.002577	-0.011882	-0.038020
51	0.132861	0.002728	-0.011261	-0.038232
52	0.132795	0.002813	-0.010662	-0.038293
53	0.132581	0.002834	-0.010107	-0.038212
54	0.132237	0.002795	-0.009612	-0.038003
55	0.131787	0.002701	-0.009193	-0.037683
56	0.131253	0.002560	-0.008857	-0.037273
57	0.130664	0.002382	-0.008613	-0.036794
58	0.130043	0.002175	-0.008462	-0.036268
59	0.129418	0.001948	-0.008402	-0.035720
60	0.128811	0.001713	-0.008430	-0.035171

TABLE 18

The Results of Variance Decomposition of Insurance Stock Index

Variance Decomposition of ISI:					
Period	S.E.	ISI	IT	IF	ER
1	0.086692	100.0000	0.000000	0.000000	0.000000
2	0.130519	98.90150	0.544529	0.162299	0.391670
3	0.165431	98.23252	0.748734	0.417668	0.601081
4	0.195400	97.68352	0.834733	0.734884	0.746859
5	0.222586	97.17119	0.860217	1.084817	0.883772
6	0.248183	96.67180	0.847505	1.439354	1.041344
7	0.272885	96.18268	0.808513	1.772806	1.235999
8	0.297103	95.70686	0.752298	2.064435	1.476404
9	0.321074	95.24809	0.686631	2.300076	1.765207
10	0.344915	94.80953	0.618029	2.472571	2.099873
11	0.368661	94.39371	0.551543	2.581177	2.473573
12	0.392286	94.00274	0.490663	2.630275	2.876324
13	0.415722	93.63853	0.437408	2.627778	3.296285
14	0.438872	93.30289	0.392548	2.583546	3.721021
15	0.461626	92.99749	0.355901	2.508018	4.138589
16	0.483866	92.72383	0.326642	2.411178	4.538351
17	0.505477	92.48305	0.303586	2.301854	4.911510
18	0.526359	92.27587	0.285415	2.187345	5.251370
19	0.546424	92.10247	0.270856	2.073285	5.553391
20	0.565608	91.96243	0.258789	1.963704	5.815079
21	0.583867	91.85472	0.248317	1.861197	6.035771
22	0.601182	91.77769	0.238786	1.767174	6.216351
23	0.617556	91.72915	0.229780	1.682129	6.358942
24	0.633013	91.70641	0.221089	1.605910	6.466590
25	0.647594	91.70641	0.212667	1.537967	6.542957
26	0.661358	91.72581	0.204579	1.477561	6.592047
27	0.674372	91.76115	0.196957	1.423923	6.617971
28	0.686715	91.80893	0.189947	1.376371	6.624749
29	0.698469	91.86579	0.183675	1.334368	6.616171
30	0.709719	91.92854	0.178221	1.297538	6.595698
31	0.720548	91.99433	0.173600	1.265649	6.566418
32	0.731038	92.06064	0.169767	1.238563	6.531034
33	0.741265	92.12532	0.166616	1.216177	6.491883
34	0.751299	92.18666	0.164000	1.198359	6.450978
35	0.761204	92.24331	0.161750	1.184894	6.410049
36	0.771035	92.29427	0.159694	1.175452	6.370585
37	0.780838	92.33889	0.157676	1.169565	6.333867
38	0.790652	92.37680	0.155572	1.166644	6.300980

39	0.800506	92.40789	0.153294	1.165998	6.272817
40	0.810419	92.43225	0.150799	1.166882	6.250070
41	0.820402	92.45016	0.148082	1.168543	6.233211
42	0.830460	92.46208	0.145169	1.170271	6.222481
43	0.840587	92.46857	0.142108	1.171443	6.217880
44	0.850771	92.47032	0.138961	1.171557	6.219166
45	0.860998	92.46809	0.135789	1.170249	6.225875
46	0.871244	92.46270	0.132651	1.167302	6.237349
47	0.881486	92.45500	0.129591	1.162635	6.252776
48	0.891697	92.44583	0.126641	1.156289	6.271241
49	0.901851	92.43600	0.123820	1.148401	6.291780
50	0.911921	92.42626	0.121133	1.139178	6.313429
51	0.921884	92.41728	0.118576	1.128868	6.335277
52	0.931719	92.40962	0.116141	1.117741	6.356502
53	0.941407	92.40372	0.113815	1.106062	6.376405
54	0.950936	92.39990	0.111589	1.094085	6.394422
55	0.960295	92.39837	0.109454	1.082036	6.410140
56	0.969479	92.39919	0.107405	1.070114	6.423292
57	0.978487	92.40232	0.105440	1.058488	6.433748
58	0.987323	92.40764	0.103562	1.047296	6.441501
59	0.995992	92.41493	0.101772	1.036649	6.446649
60	1.004503	92.42391	0.100074	1.026638	6.449375