THE RELATIONSHIP BETWEEN MACROECONOMIC VARIABLES AND STOCK PRICE VOLATILITY FOR FIRMS LISTED AT THE NAIROBI SECURITIES EXCHANGE

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DECLARATION

I, the undersigned, declare that this is my original work and has not been presented to any institution or university other than the University of Nairobi for examination.

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D63/79534/2015

This project has been submitted for examination with my approval as the University supervisor

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DEDICATION

I dedicated this work to my late mother Fatuma Jirow.

ACKNOWLEDGMENT

I would like to express my sincere gratitude to my supervisor Dr. Duncan Elly a lecturer at University of Nairobi MBA Program, School of Business, for his encouragement, support, guidance and supervision from the initial to the final level enabling me to develop an understanding of the research project.

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ABSTRACT

Arising market problems may be related to huge fluctuations in macroeconomic fundamentals and asset prices. Stock price volatility refers to average rate at which the price of a security fluctuates or simple it's the variation in stock price. The major factors that influence the prices of a share are; interest rate changes, money supply, inflation, political environment, legislative amendments. There are competing views on the interplay between stock market and the macro economy. The Nairobi Securities Exchange (NSE) has seen drastic volatility in share prices. The study looked at the effect of macroeconomic variables on stock price volatility for firms listed at the Nairobi Securities Exchange. Literature review was gathered from various sources with more emphasis on more current literature from renowned authors in stock prices/ price volatility. The study adopted a causal research design. The study used a five year (2011 to 2015) secondary data obtained from NSE, Kenya National Bureau of statistics (KNBS) and the Central Bank of Kenya (CBK) using the data collection template. A multiple linear regression model was applied since it was the most suitable econometric model that describes and evaluates the relationship between stock price volatility and one or more macroeconomic variables. Diagnostic tests were conducted on the data collected to determine if they were suitable for multiple linear regressions. The study used the regression coefficients to test the magnitude of the stock sensitivity to macroeconomic variables. Also, the study used correlation, ANOVA and coefficient of determination (R2) to determine the models significance. Data analyzed was presented through frequency distribution tables and figures and in prose form for easy understanding. From the findings the study concluded there are weak positive associations between stock price volatility and broad money, exports rates and exchange rates. Stock price volatility has statistically significant weak negative associations with interest rates. Also, the study concluded that broad money negatively influences stock price volatility, interest rates negatively influences stock price volatility, exchange rates positively influences stock price volatility and export earnings positively influences stock price volatility. The study concluded that a two month lagged exchange rates causes' stock price volatility, export earnings and interest rates while two month lagged interest rates causes' exchange rates. The study recommended that the government of Kenya should try to reduce the variable fluctuations that is; seek to minimize fluctuations on the variables; broad money, interest rates, export earnings and exchange rates. Further the study recommended that NSE should put in to place practices/strategies that will enable control of macroeconomic variables in order to moderate the stock price volatility. Also, Local researchers and academicians should increasingly study the macroeconomic variables that influence stock price volatility to add on to the limited literature in Kenya.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The effect of selected macroeconomic factors on stock prices has received significant consideration, hence becoming a subject of growing theoretical and empirical investigation. It's paramount to examine the dynamic association between macroeconomic variables and stock price volatility in formulating a country's macroeconomic policies. Hussainey, *et al*. (2011) stated that the high volatility of equity returns in Nigeria Stock Exchange is as a result key variations on macroeconomic variables such as broad money, real economic activities, world oil prices, inflation, rates of exchange, inflation, and credit facilities directed to the private sector of the country. Kirui, Nelson and Onono (2014) explain that stock market is important institution of the economy whose nature and state greatly influences the performance of the country. The overall state of the stock market therefore concerns not only the government but also private investors' and all other stakeholders.

The theories underpinning the connection between macroeconomic variables and stock prices volatility includes but not limited to initial studies by Fama (1965), and Working (1960) support the efficient market hypothesis. Shiller (1989) argues that there is enough evidence to the random-walk performance of stock prices. Among several theories that have been put forward explaining the effect of macroeconomic variable on stock price volatility, the CAP Model and APT is the utmost common.

The Securities Exchange of Nairobi has recorded huge variations in share prices in the last recent years. In the year 2004 the market capitalization recorded a drop of 88.83 billion in the month of March (NSE, 2005) while in 2007 between the month of January and March the market made a loss of 17.6% (NSE, 2008). The stock market has experience a market capitalization loss of Ksh 132.64 billion on account of changes in exchange rate and money supply among other macroeconomic factors. According to *Kenya Monthly Economic Review, October 2015*, the NASI and NSE 20 share indices declined by 10 points and 304 points respectively, in October 2015. The market capitalization lost KSh 132.64 billion on account of a fall in share prices.

1.1.1 Macroeconomic Variables

According to Romer (2012) Macroeconomics is the study of the economy as a whole .That is it focuses on the behaviour of an entire economy-the "big picture" which can be regional, national or international. In macroeconomics, we worry about such national goals or aggregate indicators also referred to as variables. These variables include interest rates, economic output, employment and unemployment, huge population, inflation, the government financial and budget balances as well as those of international trade and productivity. Aguiar and Broner (2006) argued that problems affecting emerging markets are massive variations in macroeconomic fundamentals and asset prices.

According to Brinson et al. (1991) macro-economic variables are critical to a country both at the national and county level and impact many people. These variables pose a great influence and include the following; rate of interest, (GDP), rate of exchange, supervisory framework. Wasserfallen (1989) and Pearce, Roley (1985) advance that key macro-economic variables that influence investment markets include interest rates, inflation, economic growth, exchange rates, current account and fiscal deficits.

1.1.2 Stock Price Volatility

Stock Price Volatility can be defined as the degree of deviation or differences in the daily stock prices on a timely basis that is as an outcome of differences in the amount of uncertainty and whether the change is positive or negative. It is an unavoidable experience of the market that is an outcome of market fundamentals, information and the stock market expectations. According to Baskin (1989), Stock price volatility denotes the average rate at which security prices differ. The volatility in stock prices is assessed through calculating the annual standard deviations of daily changes in stock prices. If the price difference is high within a short period of time then the stock has a high volatility but if there is no big difference in prices in such a duration of time then the stock has a low volatility. Some amount of variations is usually unavoidable and also desirable since they help in a better allocation of resources through changes in economic resource allocations. Such variations in stock prices are favourable, however quick and wide stock variations result in uncertainties in the stock prices and thus significantly affecting the confidence of the investors (Mao & Kao, 1990).

Stock price volatility can be utilised by investors to degree the capability of a significant risk of a given stock. Adjustments in stock prices lead to diverse societal factors like financial, political and economic elements. The corporations earnings, their techniques, accordingly, corporate profitability, enterprise approach, product great, political balance, interest fees among other elements ought to have a position to determine the intensity of price fluctuations, as the market actions from one equilibrium to some other. On the same time records about the changes in fundamentals should spark marketplace interest changing the panorama of destiny costs. (Kuranguri, 2006). Stock volatility is associated

with commercial enterprise cycle, recessions, booms or recovery times. Stock volatility is better at some point of the recession and decrease at some point of the boom duration of the financial system. High inventory returns imply better normal increase of an economy and vice versa. Stock return volatility results in uncertainty which hinders powerful overall performance of the financial zone in addition to the entire financial system at massive (Olweny & Omondi, 2011).

Karungari (2006) explained that volatility is an important subject for all investors or anyone dealing with finances. He explains that it is the aim of every investor to understand to what extent his stock is volatile or the amount of risk is subjected to. He further documented that volatility reflects the importance of variability or dispersion around the central tendency, thus it indicates the extent and the likelihood of a possible return realization hence help to give the possible range of values the stock will be in, in his work he noted that, when an investor knows how much volatility he is exposed to, he can make an informed decision on his investment.

1.1.3 Macroeconomic Variables and Stock Price Volatility

According to Fama (1990), economic growth impacts the profitability of firms by affecting the projected earnings, shareholders' dividends and stock prices variations. Monther & Kaothar, (2010) says the main purpose of the stock market is to offer an avenue in which consumers and suppliers intermingle for the sole purpose of transacting in various securities and share distributed by public companies.

Financial economists view monetarist strategy as the most significant macroeconomic policy mechanism. The impact of supply of money on stock prices has received considerable attention. Money supply plays a fundamental role in determining stock prices and it's also overall indicator of economic prospect. (Kenneth and Dwight 2011).

The share price is tremendously responsive to any nature of some price-determinants info, appropriate for imminent market trends. The price-determinants factors are mainly macro-economic factors include rate of interest, rate of exchange, supply of money & export earnings. the most important determination of share prices is define by numerous macroeconomic variables include fluctuation in the rate of interest, exchange rate, supply of money change in interest rates, money supply, inflation, instability and revised regulation (Ochieng and Oriwo, 2013).

The top-down technique holds that both the economy and industry appreciably affect the total returns for an investor regardless of the characteristics of the firm. On the other hand, the bottom-up technique contends that it is significantly possible for stocks to generate superior returns, regardless of the economic and industry factors. The results of numerous academic research investigating the consequences of economic variables on stock price volatility have supported the top-down investment criteria. In addition to the quality of the individual firms and their profit capability, it is also important to note that industrial performance where firms function and the commercial atmosphere influences the stock value and stock-return. For that reason, a few microeconomic factors should be regarded as a priori of threat that are common to all firms (Reilly and Brown, 2010).

1.1.4 Companies Listed at Nairobi Securities Exchange

The NSE has 65 listed firms which are classified into eleven sectors specifically; agricultural, car and accessories, banking, commercial services, telecommunication and technology, manufacturing and allied investment, insurance, energy and petroleum, growth enterprise market segment and construction and allied. Nairobi Securities Exchange (NSE) Limited is a Kenyan institution that offers securities trading facility. The Nairobi Stock Exchange (NSE) became constituted in 1954 as a volunteer association of stock-traders listed with the Act of Societies.

The NSE is controlled by using the CMA Act of 2012 which offers surveillance for regulatory compliance. This has led to continuous lobby by authorities to create a conducive environment or framework that can increase both economic growth and private sector growth thus enhancing the stock market (Ngugi, 2005). The NSE is also reinforced through the principal Depository and settlement agency (CDSC) which presents distribution and disbursement services for securities transacted at the security market. It manages the behavior of principal Depository retailers created from stock-traders and investments financial institutions which might be individuals of NSE and Custodians (CDSC, 2004). Those supervisory structures are directed to sustain a vigorous securities marketplace change that helps distribution of capital permitting price discovery to take region liberally based on demand and supply.

The NSE performs an increasing number of critical position inside the Kenyan economic system, especially in the privatization of business owned by the government. Within the last ten years, nine public corporations have been efficiently privatized through the NSE

wherein the authorities has raised about five billion Kenya shillings. Most of the companies have experienced market capitalization loss on account of change of macroeconomic factors consist of the rate of exchange, supply of money, export earnings etc. According to the *Kenya Monthly Economic Review, October 2015*, the NASI and NSE 20 declined by 10 points and 304 points respectively, in October 2015. The market capitalization lost KSh 132.64 billion on account of fall in share prices.

1.2 Research Problem

There are competing views on the interplay between stock market and the macro economy. One view begins with the idea that some real factors (typically unobservable to researchers) lead to variations in prospective real rate of return on capital. Given the discount rates for owners of capital, an increase in prospective returns raises stock prices and vice versa. Researchers have attempted to use surrogate measures for these real factors (or economic fundamentals) that determine stock prices. The commonly used surrogates include overall economic activity (as captured by GDP), business investment, consumption, national income, household wealth, household investment, inflation, interest rates, money supply and so on. The second approach considers stock prices to behave in a random manner and as such they are unrelated to economic fundamentals. This appears to be the view that Keynes held when he termed stock markets as gambling casinos. Economists who view the stock market as gambling casinos would not carry out regressions between stock prices and economic variables (Munene, 2007).Wang (2010) explain that the variations in the price of stock constantly act as the base of interest in the entire financial markets because their impacts affect investment strategies.

The NSE has experienced irregular share price volatility. A notable example is 2011 Scenario the NASI noted an abnormal variation from 4495 points to 3733 points with industry capital decreasing from Kes 1192.28 billion dollars to Sh1049.56 billion dollars (NSE, 2011). This significantly affected the value of many firms listed at the NSE. In the period between 2000 and 2013, investors at the Exchange have been anxious as the market remained unsettled with stock prices sinking to different points (Bitok et al., 2011).

Worldwide thinking about the relationship among selected macroeconomic factors and inventory price instability consists of the works of Naik (2013) who examined the connections among the India production index, commodity-priced index, supply of money and stock market index. According to Osamunyi & E. Osagie (2012) looked at the connection between macroeconomic factors and the Nigeria money market index. According to Aydemir and Demirhan (2009) used everyday statistics as of Feb 2001 to Jan 2008 of Turkey studied impact of macroeconomic indicators on indices of stock prices. The research founds a bidirectional causal relationship between exchange rate and all stock market indices.

Numerous local studies have been done to describe and evaluate macroeconomic factors, stock price volatility, stock-returns and performance of stock market. Olweny and Omondi (2016) provide evidence that rate of interest, rate of exchange and inflation rate have a substantial impact on stock price volatility. Aroni (2009) show that exchange rate fluctuations has an effect on stock price volatility. Though there have been several studies carried out in Kenya on stock market volatility which include; Equity risk and returns

factors (Malamba, 2002), Volatility of stock returns (Muriu, 2003), the influence of macroeconomic variables in the volatility in return on stock (Olweny & Omondi, 2010), the effect of inflation on stock market return and highly-volatile (Murungi, 2012) and macroeconomic variables and the performance of stock market (Ochieng and Oriwo, 2013), the indication of impact of macroeconomic factors on stock price volatility is however inadequate. Within this background, the question that arise from this study is the relative influence of selected macroeconomic factors on the volatility in stock prices for public companies listed at the NSE?

1.3 Research Objectives

The key research objective of the study is to analyse the relationship between macro-economic factors and stock price volatility for firms registered at the Securities Exchange of Nairobi.

1.4 Value of the Study

The information provided in this study enables NSE to control selected macroeconomic variables in order to moderate the stock price volatility consequently enhancing the stability and the efficiency of the security market. The research is also vital to the companies and financial organizations. The results of this study are of vital to financial institutions in that rate of interest have a significant adverse effect on share prices. The impact of macro-economic factors on stock prices has received considerable attention. The result from this study has a valuable contribution to theory building and practice.

The studies have shown macroeconomic factors are key factors taken into account by an investor before he/she makes that rational investment decisions. This study further observes how macroeconomic factors such as political uncertainties, export earnings; exchange, rate of interest, supply of money impact the stock prices in the Nairobi stock exchange both in terms of statistic and investors perception. The result from this study will enable the government to create an enabling environment that will foster favourable foreign exchange rates, political stability, and moderate money supply and enhance export earnings. The results of this study are vital to scholars and researchers. The study is also essential in promoting further research aimed to enhance the performance of the stock markets by controlling macroeconomic variables.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter summaries four sections that give theoretical and empirical back up to the study. The first section summarizes theories underpinning the association between macro-economic factors and stock price volatility. The second section evaluates the determinants of stock price volatility. Section three and four reviews the empirical studies and the literature respectively.

2.2 Theoretical Review

Fama and Schwert (1977) studied the relationship between macroeconomic factors and fluctuation in stock price volatility. According to Harun, Yazand Paul (2013), in many years the connection between macro-economic factors, stock price and investment decision has been thoughtful among economists. Within the theoretical literature, numerous empirical researches observed the impact of macroeconomic variables such as supply of money, exchange, inflation & stock price volatility. Nonetheless, the causation remains unanswered in the literature.

2.2.1 Efficient Market Hypothesis

The market where the prices of security give real and true value of the asset is an efficient market. It is important to understand the term ‘efficient’ as used in this theory. Efficient as used here done not mean that the security prices are often a true reflection of the real value of the asset but simply means that the quoted price takes into account all the information in the public domain to all potential investors. The efficient market theory or hypothesis (EMH) become widely adopted after a series of empirical tests in economic theory have been developed by a finance theorist Fama (1970).

Fama (1970) argued that depending on the kind of data that is revealed in the stock prices, the markets are efficient in three levels. All historical price information's are incorporated in the current price in a weak form of the efficient market hypothesis. This means that the security prices variations are random and cannot be predicted using past information. This is often referred to as the 'random walk' theory. Under semi-strong efficient market hypothesis, the present-day price reveals not only all historically price-shaping info however all info in the public domain (as well as organizations comprehensive statements of financial position) and therefore no method will uses this kind of information would help in identifying undervalued stocks under this market form. The strong form of efficiency market hypothesis postulates the present-day price reveals all price-shaping information in private and public domain and barely any investors will be able to constantly find underestimated stocks. This theory is helpful in determining stock market returns and prices are explained by other variables that are not specific to the organization, these variables include macro-economic variables.

2.2.2 Modern Portfolio Theory

Markowitz (1952) developed Modern Portfolio Theory (MPT) to enable investors to examine their expected returns primarily based on the predisposed risks. This theory seeks to maximize the investors return on the portfolio and to minimize the portfolio risk in any level of expect return of a portfolio. Markowitz therefore encourages diversification of assets to avoid market risks. This enables in controlling both the kind and the amount of expected risk and return.

MPT emphasizes determination of the numerical interactions among the specific securities that encompass the total investments rather than analyzing the characteristics of individual investments (Omisore et al., 2012). However, they further suggest that it is important to consider how each asset changes in price relative to how every other asset in the portfolio changes in price considering other internal or external factors. Markowitz claims that investment portfolio is an important concept leading to applicability of the theory to this study. This is because it shows how investors approach varied risks due to perceived better returns from their investment decisions, even when there is no outright feasible return on investing in particular securities. In this regard therefore, macroeconomic conditions in addition to known market risks need to be evaluated to avoid making rational decisions based on market behavior.

2.2.3Arbitrage Pricing Theory

The theory helps in determining asset values using the law of one price and taking no arbitrage. APT argues, asset prices are affected by numerous macro-economic variables. However, CAPM assumes security value is solely determined by one key macroeconomic factor.

The Arbitrage Pricing Theory arose as an alternate to CAPM. The shortcoming of CAPM is that it determines the returns of a security by only factoring in the return on the market. Fama (1977) argue that whether or not the models issues replicate weaknesses within the concept or in its practical application. CAPM is invalid due to its failure to empirical application. The model is founded on subjective sound judgement, and most of its underlying assumptions are unrealistic. A proposed extension of CAPM was done by

(e.g., Black, 1972), and Ross (1976a, 1976b) by developing entirely exceptional model. APT is based on the determination of the real intrinsic value of Asset hence no arbitrage chance exists in an efficient market. Pavola (2006) says that APT is a brand new and exceptional model that helps in asset prices determination. It tries to take into account other influences not on the market that affect securities prices including macroeconomic indicators.

2.3 Determinants of Stock Price Volatility

Stock price volatility is to most extent influenced by Macroeconomic factors. The two significant factors affecting security prices are Interest rates and foreign exchange rate risks (Hyde, 2007, Vazz*et al.*, 2008). Numerous empirical evidence has been developed that shows that indeed securities price volatility is significantly influenced by macroeconomic factors. According to Guo (2003), share price volatility in ordinary investments of shares is brought about by the systemic risk faced by those investors. According to (Hull & Alan, 1993) Statistically, volatility is the disparity of the return on an asset from their mean. Damodaran (2012), volatility is the deviation of mean returns from expected returns and therefore represent either positive or negative volatility otherwise known as upside or downside risk.

2.3.1 Money Supply

Monetary policies have been taken to be the most critical macroeconomic policy instruments by both economists and scholars. The most proficient instruments of central banks is the monetary policy. According to Maskay (2007), central banks use monetary policy as the most significant tool in influencing the actual economic growth of their

respective countries. Many scholars including Keran (1971), Gupta (1974), and Shostack (2003) argue that the most significant macroeconomic variable that influences the prices of the stock and their price variations to be the money supply instrument of monetary policy.

Shostack (2003) explained the relation between return on stocks and money supply. He asserted that the supply money supply in an economy does not only affects the affects the economy but also has a important impact on the expected returns of stock. An increase in growth of type two money (M2) which includes demand deposits in savings accounts, notes and coins, and currency in circulation would normally mean that there are resources available to buy stocks but can also result to inflation thus decreasing the stock prices.

2.3.2 Exchange Rate

According to Hyde (2007) and Vazz et al., (2008) the two essential economic attributes that affect common securities are the interest rate and foreign exchange rate risks. According to Aggarwal (1981) variations in the rate of exchange affects the proceeds in the financial statements of international enterprises in the world leading to changes in their stock prices. This is a traditional approach that believes that fluctuations in the rate of exchange results variations in stock price. This approach tries to show the connection between rate of exchange and stock prices. The customary method postulates rate of exchange should lead price of a stock. Exchange variations impact firms standards by enhanced competitive edge and changes in the financial position of the firm, currency denomination, finally determents companies ‘profit and stock.

2.3.3 Export Earnings

Stordel (1990) focused on the direct relation between earnings on export fluctuations and development of capital (key element of economic growth) using a country-specific approach for twelve developing countries during the years 1963-1983. The results of this study indicated that export earnings variations negatively affected seven out of twelve countries. Also of importance to note in this study is that more significant impact was experienced by those countries with small domestic markets and have heavy reliance on few primary commodities and unprocessed goods.

2.4 Empirical Review

Muradogalu and Metin(2001) in their study of the long run consequence of monetary policies on return on stock in an developing market found out that influence of money supply on interest rates diminished over time as markets gained maturity as foreign currency regained their importance. The duo also cautioned against the use of the findings in developing investment strategies due to the fact that the variables explaining the change in interest rates change over time.

Similarly, Ibrahim and Aziz (2003) in their study of the effect of stock price on macroeconomic factors which included industrial production, exchange rates, supply of money(M2) and final-consumer price index established a significant relationship among industrial production, consumer index and stock prices while exchange and money supply (M2) posted a negative relationship.

Patra and Poshakwale (2006) in their analysis of dynamic adjustments and equilibrium effects of consumer-product price index, supply of money, rate of exchange and quantity of trading, and stock prices in the developing securities market of the republic of Greece during the years 1990 to 1999 found out that there a correlation between consumer-product price index, supply of money and quantity of trading and stock return both in the long and short run equilibrium, hence no correlation between exchange and stock prices. The study also revealed that information to the public domain on macro-economic factors can be used in forecasting security market prices thus rendering the Athens stock exchange market informational inefficient.

Aydemir and Demirhan (2009) examined the correlation between three stock price indices; national 100, financials and technological industry index and macroeconomic variables in Turkey between 2001 to 2008 found out that a strong correlation exist between rate of exchange and all the three security market indices. Using quarterly data of the years 1986 to 2008 the study found out that national 100 services, financial and industrial indices negatively affects the exchange rates. Technology however posted a positive relationship with exchange rates.

Fowdar and Koonjal (2011) conducted a study in Mauritius to determine whether macroeconomic variables affect returns of the stock exchange. They conducted regression analysis and concluded that macroeconomic variables affect stock exchange. Since macroeconomic variables can influence performance in stock market, foreign investors use political risk to evaluate the performance of the stock market.

Mohammad et al. (2009) examined the relation industrial-production index, rate of foreign exchange, share price at Karachi Stock Market in Pakistan. The results of this study revealed both rate of foreign exchange and foreign reserves considerably impact stock prices. The study also noted that the influence of the two variables was also as a result of the reforms of the year 1992. The study also showed that consumer-price index and gross fixed capital formation too affect stock price. There was also a positive influence on stock prices by other variables such as supply of money and rate of foreign exchange.

Adam and Tweneboah (2015) used Vector Error Correlation model (VECM) and Cointegration for data of 17 years i.e. from 1999 to 2015 but on quarterly basis to look at impact macro-economic variables on price of stock in Ghana. They were observing short-run & long-run relation on stock prices in Ghana. -.044 The VECM exhibited rate of interest lagged have important influence on stock market.

According to Attari and Safdar (2013) in Pakistan did a similar study in examining macroeconomic variables and stock market prices by applying Exponential GARCH. They used monthly data from December 1991 to August 2012 to explore time series analysis of They used also ADF and ARCH to check for correlinearity and homoscedasticity. The result of the research shown that there exists a significant influence of microeconomic variables on the prices of stock. This study also came to the conclusion that there is high volatility in Karashi stock market in Pakistan.

Patel (2012) used periodic statistics as of January 1991 to December 2011 examined effects of macroeconomic determinants on the Indian Stock market performance. He also used eight macroeconomic variables: inflation, rate of exchange, industrial production index, interest rate, supply of money, price index of Gold, Silver and Oil. By applying ADF, Johansen co-integration test and VECM the study found that interest rate is I(0); rate of exchange, IIP, prices of Gold, Silver and Oil are I(1) and supply of money and inflation is I(2). The study as well established significant relationship between macro-economic factors and stock market indices.

A similar study had been done earlier in Nigeria by Maku and Atanda in 2010 using ADF (Augmented Dickey Fuller) unit root examined the relationship between macro-economic factors and the performance stock market in the republic of Nigeria between the periods of 1984 and 2007. The results showed that Nigeria Stock Exchange is highly sensitive to fluctuations in the rate of exchnge, real output, rate of inflation and supply of money. The study established that macro-economic variables have a trivial effect on the performance of stock market in Nigerian. They therefore, suggested stakeholders to consider the above factors rather than Treasury bill rate in their investment decision.

Qundir (2012) used ARIMA (Autoregressive Integrated Moving Average) model examined effect of selected macroeconomic factors on the rate of interest and index on industrial production on Dhaka stock returns as of Jan 2000 and Feb 2007. He found that a strong relation exists among rate of interest and index on industrial production with stock returns in Dhaka stock market. However, the figures did not show a significant relationship statistically.

Olweny and Omondi (2011) put forward evidence which shows that rate of interest, rate of exchange and rate of inflation have a important impact on stock return volatility. In undertaking the study to establish how macroeconomic factors affect stock market performance, they made a collective assumption that the effects are the same in all the firms in the same way. They, however, failed to note that the nature and the extent of such contribution to performance differ from one company to another.

Ochieng and Oriwo (2013) looked at the effect of macroeconomic variables on NSE All share index. In their study they also tried to determine whether microeconomic variable changes can be helpful in predicting future NSE all share Index. The study looked at rate of interest, rate of inflation and ninety one days Treasury-bill as three important macroeconomic variables. Using regression analysis, the study found out that the 91 – day T bill negatively affected the NASI while rate of Inflation had a fragiled-positive relation with the NASI. In the conclusion of this study, the study advocated for close monitoring of the macroeconomic environment as a result of the impact the stock market performance which significantly influences decisions foreigners make on the local investments.

2.5 Conceptual Framework

This section presents the relation about the independent and dependent variables of the study. According to (Mugenda and Mugenda, 2003) the framework outlines a working definition of variable and uses a diagram to pose a vivid and easy clarification of the movement of conceptual-framework. In this study, the dependent variable will be stock price volatility while the independent variables will be exchange rate, money supply and export earnings.

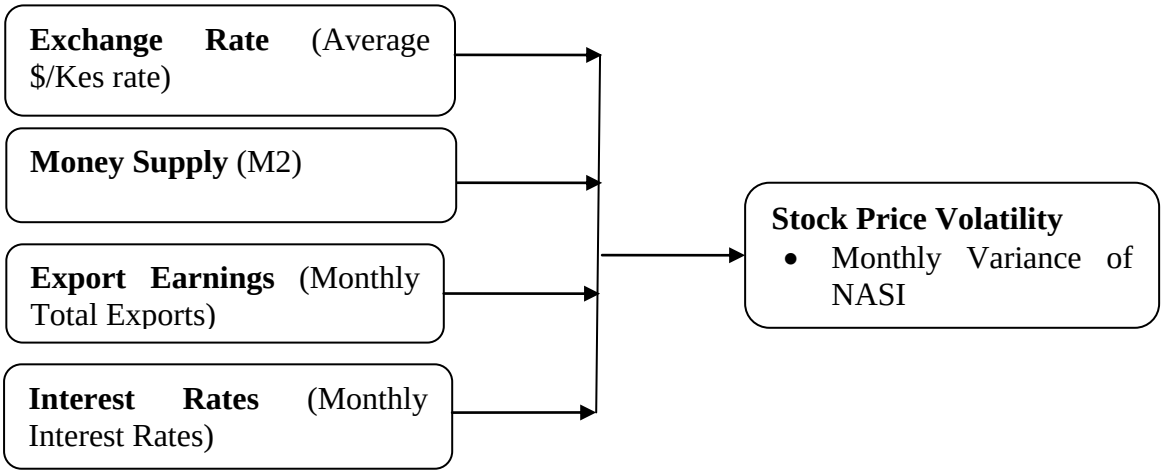


Figure 2.1: Conceptual Framework

2.6 Summary of the Literature Review

The empirical studies reveal convergence in that there is correlation about selected macroeconomic variables and stock price volatility; Mohammad et al. (2009) study results ascertain that rate foreign exchange and foreign reserve considerably impacted the stock prices. Consistent with Aydemir & Demirhan (2009), Patra and Poshakwale (2006), Ibrahim and Aziz (2003).However, despite the vast empirical literature on stock price volatility, there are mixed empirical results regarding the connection between macroeconomic variables and stock price instability, the specific nature of thie relationship is yet to be established, with scanty research on emerging markets. This study aims to fill these gaps.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methodological approach the study took in achieving its objectives. The chapter provides a comprehensive and in-depth analysis of data.

3.2 Research Design

The research embraced a causal research design. Brains, Willnat, Manheim and Rich (2011) explain that causal research design proves the effect and cause correlation between variables. Thus, the research design was instrumental in investigating the correlation between macroeconomic factors (supply of money, rate of exchange, export earnings) volatility in stock prices such that predictions were made based on the level of association. According to Zikmund, Babin, Carr and Griffin (2012), causal design also looks at the state and nature of the relation between the causal variables and has the advantage of greater levels of internal validity. The study was invaluable as secondary data on macroeconomic variables was sought.

3.3 Data Collection

This study used a five year (2011 to 2015) secondary data acquired from NSE, KNBS and CBK using the data collection template attached as appendix one. The macro-economic factors includes rate of exchange, supply of money & export earnings were collected from CBK monthly reports. The data for annual export earnings, floating value of the exchange rate which was denominated against the U.S Dollar were sourced from Kenya National Bureau of Statistics. Daily stock prices were obtained from the Nairobi Security Exchange.

3.4 Diagnostic Tests

Diagnostic tests or tests of statistical assumptions were conducted on the data collected to determine if they were suitable for multiple linear regressions. This includes test of sampling adequacy, normality, linearity, independence, and homogeneity and multi-co linearity. Kaiser-Meyer-Olkin Measure (KMO) and Bartlett's Test of Sphericity tests was conducted to institute the data's adequate sample. Normality was tested using the Shapiro-Wilkand Jarque-Bera tests. Multi-co linearity was tested through Variance Inflation Factors (VIF) and tolerance. Levene's test of homogeneity of variances was used to test Homoscedasticity. Independence assessed through the Durbin-Watson test.

3.5 Data Analysis

Measures of central tendency was applied (mean, median, mode and percentages) as descriptive statistics to explain the data. A multiple linear regression model was applied. Stock price volatility was the dependent variable and macroeconomic factors as the independent variables. Multiple regression model is the most suitable econometric model that describes and evaluates the correlation between macroeconomic variables and stock price volatility.

3.5.1 Analytical Model

The multiple regression model is expressed as:

$S = \beta_0 + \beta_1 EXRATE_1 + \beta_2 EXP_2 + \beta_3 MS_3 + \beta IRS_4 + \varepsilon$

S: Stock price volatility measured as the monthly variance in NSE-20 share index

EXRATE: Exchange rate measured as the average monthly exchange rate of Kenyan Shilling to US Dollar

EXP: Export earnings measured as total value of monthly Kenya's export

MS: Money supply measured as total value of Kenya's monthly broad money, M2.

IRS: Monthly Interest rates

β_0: regression constant which is the y-intercept.

$\beta_1$toβ_3: regression coefficient; that is, sensitivity of stock prices to changes in the macroeconomic variables

ε: Error term.

3.5.2 Inferential Statistics

The study used the regression coefficients to test the magnitude of the stock sensitivity to macroeconomic variables. The study used correlation, ANOVA and coefficient of determination (R^2) to determine the models significance. ANOVA was used in evaluation of variance for relate group means in order to establish whether the means of the variance of numerous groups are all equal. This helped the study to establish whether there is a substantial connection between the independent and dependent, hence the significance of the regression model. From ANOVA, f-test was tested for joint significance of all coefficients and t-test for significance of individual coefficients.

Correlation coefficient (R) determined the nature and direction of the relationship while R^2 established the strength of such relationship. The correlation coefficient ranged from -1 to 1 and measures the magnitude of linear dependency between two variables, the

higher the magnitude of association between two variables the higher the range (-1 to 1). According to Cohen (1988) established that a range correlation of 0.3 – 0.5 reveals a moderate linearity and 0.5 – 1.0 demonstrations stronger linearity between two or more variables.

To test for Stationarity in the data set, unit root testing using the ADF test was conducted. The Augmented Dickey Fuller test is a negative test for stationarity. The stronger the test at a given level of confidence, the higher the levels of stationarity in the data set. The study adopted test of Granger causality to found any correlation between stock price volatility and macro-economic variables.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

The chapter exhibit information processed from data collected during the study on the connection between stock price volatility and macro-economic variables for firms listed in NSE.

4.2 Descriptive Statistics

The study sought to establish the general description of the study variables characteristics comprising the Mean, (Std. Dev), minimum (Min), maximum (Max),. The results from the analysis of findings are illustrated in the table 4.1 below.

Table 4.1 Descriptive Statistics

	Minimum	Maximum	Mean	Std. Dev
Interest Rates	2.63	3.01	2.82	.111
Stock Price Volatility	2.74	4.98	3.96	.554
Exchange Rates	4.39	4.66	4.49	.0651
Exports	24.29	24.81	24.50	.0916
Broad Money	27.74	28.43	28.08	.214

Source: Research findings

Table 4.1 above showed that all the macroeconomic variables have positive mean. The average value for broad money is 28.08 for the five year period which is slightly higher. The standard deviation for broad money is 0.214 which is low implying that broad money has been expressly stable and lowly variable over the years. Exports earnings had similar results with that of broad money showing a slightly higher mean of 24.50 and a low

standard deviation of 0.0916 implying low variability over the period. Exchange rates showed a mean of 4.49 whereas stock volatility showed a mean of 3.96. Interest rates showed a mean of 2.82. The findings implied that the variables had a low variability over the period thus did not change frequently.

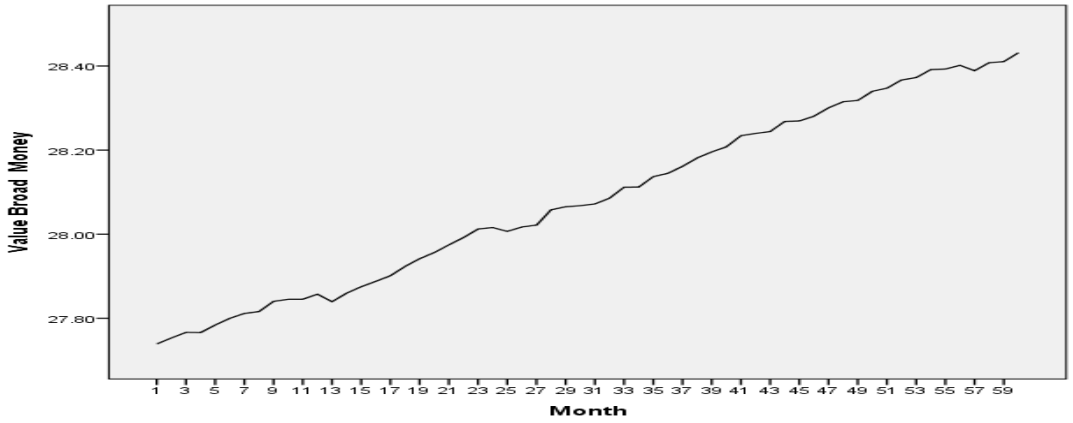
4.3 Trend Analysis

The study sought to establish monthly trend analysis (2011-2015) for broad money, exports earnings, interest rates, exchange rates and stock volatility of the firms listed in the NSE. The results from the analysis of findings are illustrated in the following subsections as shown below.

4.3.1 Value Broad Money

The study sought to determine the monthly value of broad money. The results from the analysis of findings are illustrated in the figure 4.1 below.

Figure 4.1 Value Broad Money



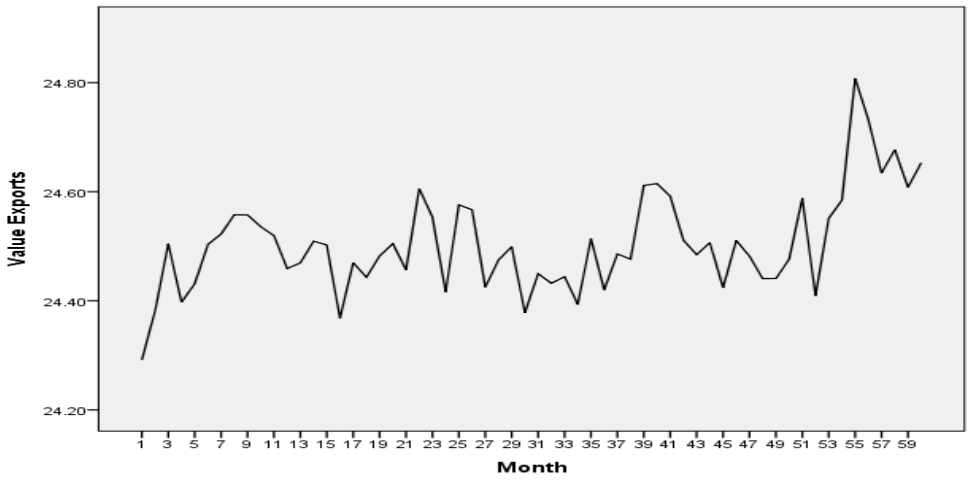
Source: Research Findings

From the analysis of the findings it was established that broad money does not follow normal distribution. There is episodes rise in value of broad value but these have not persisted.

4.3.2 Value Exports Earnings

The study sought to determine the monthly value of exports earnings. The results from the analysis of findings are illustrated in the figure 4.2 below.

Figure 4.2 Value Export Earnings



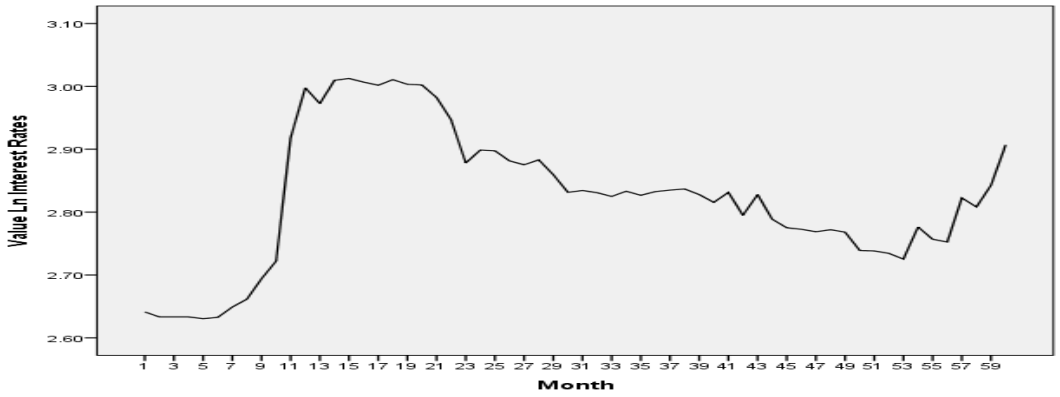
Source: Research Findings

From the figure above it is evidence that during the period examined export earnings had a significant variability and instability which resulted to the irregular periodic upward and down ward drift.

4.3.3 Value of Interest Rates

The study sought to determine the monthly value of interest rates. The results from the analysis of findings are illustrated in the figure 4.3 below.

Figure 4.3 Value Interest Rates



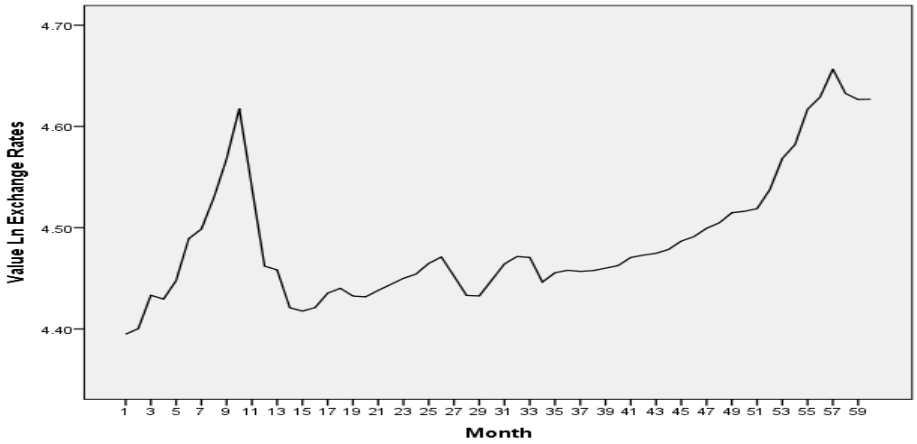
Source: Research Findings

From the findings, it was established that interest rates increased gradually then sharply during the first 11 months of the period under review. The months between 11- 14 experienced the highest increase in interest rates while between 53 and 57 months had the lowest interest rates. Since month 15 there has been a declining value in interest rates whereas in last month's interest rates has been increasing

4.3.4 Value of Exchange Rates

The study sought to determine the monthly value of exchange rates. The results from the analysis of findings are illustrated in the figure 4.4 below.

Figure 4.4 Value Exchange Rates



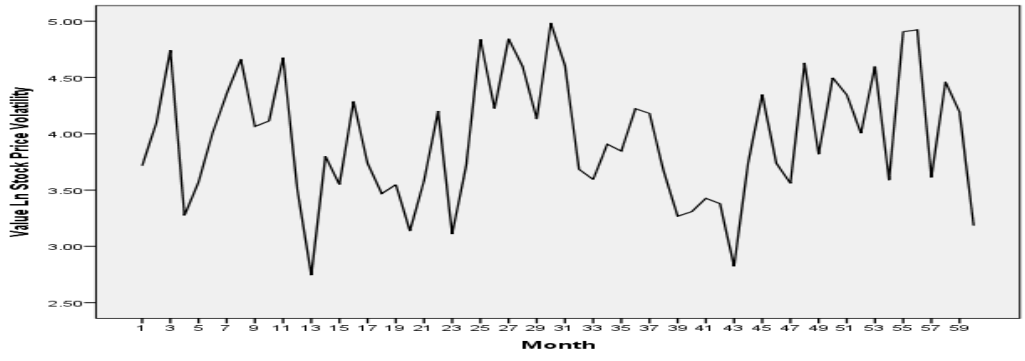
Source: Research Findings

The graph above shows that exchange rates had minimal upward and downward movements in exchange rates during the five year period thus implying that exchange rates had low variability.

4.3.5 Stock Price Volatility

The study sought to determine the monthly stock price volatility. The results from the analysis of findings are illustrated in the figure 4.5 below.

Figure 4.4 Stock Volatility



Source: Research Findings

The graph above depicted a long term positive drift in the stock price volatility of the firms listed in the NSE.

4.4 Correlation Analysis

The study sought to establish correlation analysis. Pearson's correlations analysis was conducted at 95% confidence interval and 5% confidence level 2-tailed. The results from the analysis of findings are illustrated in the table 4.2 below.

Table 4.2 Correlation Matrix

	Broad Money	Exports	Interest Rates	Exchange Rates	Stock Price Volatility
Broad Money	1				
Exports	.464**	1			
Interest Rates	-.044	-.002	1		
Exchange Rates	.594**	.676**	-.260*	1	
Stock Price Volatility	.074	.127	-.267*	.240	1

Source: Research Findings

The analysis of the findings established that there is a weak positive relationship between stock price volatility and broad money, exports rates and exchange rates of magnitude 0.074, 0.127 and 0.240 respectively. The weak positive relationship indicates that there is a weak positive correlation between the variables and stock price volatility. This infers that exchange rate has the highest effect on stock price volatility, followed by exports while broad money having the lowest effect on the stock price volatility. The study noted

that interest rates had a weak negative relationship which is statistically significant with stock price volatility with a magnitude of -0.267; this thus implied that interest rates had minimal effects on with stock price volatility. Further the study established the relationship between the independent variables. The study noted that broad money had a statistically significant moderate positive relationship with export earnings and exchange rates of magnitude 0.464 and 0.594 respectively. Exports earnings had a statistically significant strong positive relationship with exchange rates of magnitude 0.676. The study noted that interest rates had a statistically significant weak negative relationship with exchange rates of magnitude 0.260 and a very weak relationship with broad money and export earnings of magnitude -0.044 and -0.002 respectively.

4.5 Regression Analysis

The study sought to establish the regression model summaries of stock price volatility. The results from the analysis of findings are presented in the table 4.3 below.

Table 4.3 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.325	.106	.041	.54232	1.578

Source: Research Findings

Table 4.3 shows the linear association between the dependent and independent variables used in the study. The correlation coefficient of 0.325 indicated that there was a weak association between the dependent and independent variables. The determination of coefficient as shown by R^2 established the linear model accounts for 10.6% of the stock price volatility. This therefore means the four variables contribute to 10.6% of stock price

volatility. 89.4% of other factors that influence stock price volatility remain unexplained by the regression model. Durbin-Watson test was used as one of the preliminary test for regression to test whether there is any autocorrelation within the model's residuals. Given that the Durbin Watson value was approaching 2 (1.578), there was weak negative or positive first order autocorrelation amongst the model's residual values.

4.5.1 ANOVA

The study sought to establish the significance of the regression model in predicting the relationship between independent variables and dependent variables. ANOVA statistics were thus computed. The results from the analysis of findings are illustrated in the table 4.4 below.

Table 4.4 ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.914	4	.479	1.627	.180
Residual	16.176	55	.294		
Total	18.090	59			

Source: Research Findings

From the findings, an F-significance value of p = 0.180 was established showing that there is a probability of 18% of the regression model presenting a false information. The F calculated at 5% Level of significance was 1.627. The F calculated was less than the F critical value of 1.914 thus implying that the overall model was insignificant i.e. there is an insignificant relationship between broad money, exports, exchange rates and interest rates with stock price volatility.

4.5.2 Coefficients

The study sought to establish the coefficient of regression of stock price volatility shares. The results from the analysis of findings are illustrated in the table 4.5 below.

Table 4.5 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
	(Constant)	2.078	22.641		.092	.927		
	Broad Money	-.183	.415	-.071	-.441	.661	.631	1.586
	Exports	.066	1.082	.011	.061	.951	.508	1.970
	Interest Rates	-1.061	.683	-.213	-1.552	.126	.864	1.157
	Exchange Rates	1.869	1.753	.220	1.066	.291	.383	2.611

Source: Research Findings

The coefficient of regression in table above was used in coming up with the model below:

$S = 2.078 - 0.183\ MS_1 + 0.066EXP_2 - 1.061IRS_3 + 1.869\ EXRATE_4$

From the model when other factors are constant (broad money, exports earnings, interest rates and exchange rates) stock price volatility was 2.078. The study noted that when other factors are held at constant a unit increase in broad money will lead to -0.183(p=0.661) decrease in stock price volatility. Also noted in the regression analysis, an increase in exports earnings would lead to 0.066(p=0.508) increase in stock price

volatility. Further the findings established that holding other factors constant a unit increase in interest rates will lead to -1.061(p=0.126) decrease in stock volatility whereas a unit increase in exchange rates will lead to 1.869 (p=0.291) increase in stock price volatility. According to the model, the macro economic variables were insignificant as their P-value were more than 0.05, thus were negatively correlated with stock price volatility. Table 4.5 show variance inflation factors (VIF).The researcher established that all the variables had a VIF of above 1 but less than 5 meaning that there was no multicollinearity problem. The study noted that the collinearity statistics of broad money had a tolerance factor of 0.631, exports earnings had a tolerance factor of 0.508, and interest rates had a tolerance factor of 0.864 while exchange rates had a tolerance factor of .383 indicating that these variables affect the stock price volatility of the firms listed in the NSE.

4.6 Unit Root Tests

The data was subjected to Unit root tests to check for Stationarity. Augmented Dickey Fullers, Philips Perron Fisher (PP) test, Levin, Lin and Chu and Im, Pesaran and Shin W tests were used. Findings are presented in table 4.6 below.

Table 4.6 Unit Root Tests

Method	Statistic	P-Values
Levin, Lin & Chu t*	-0.50662	0.3062
Im, Pesaran and Shin W-stat	-3.52267	0.0002
ADF - Fisher Chi-square	43.0040	0.0000
PP - Fisher Chi-square	40.1855	0.0000

Source: Research Findings

As indicated in Table 4.2 above, the augmented Dickey Fuller (ADF) test, Philips Perron Fisher (PP) test and Im, Pesaran and Shin W-stat show that the variables are stationary. On the other hand Levin, Lin & Chu tests showed that the variables are not stationary and are not integrated at level one and thus the need to convert the variables to their natural log for standardization and meaningful analysis.

4.7 Granger Causality Tests

The study variables were subjected to Granger Causality tests with a lag of two months. The results of the data are presented in Table 4.7 below.

Table 4.6 Granger Causality Tests

Cause Variable	Response Variable	Causality Hypothesis	F-Statistic	P-Values	Interpretation
Exchange rates	Broad money	Exchange rates do not cause broad money	2.82968	0.0680	No Causality
	Exports	Exchange rates do not cause exports	3.98292	0.0245	Causality
	Interest rates	Exchange rates do not cause interest rates	5.27945	0.0081	Causality
	Stock price volatility	Exchange rates do not cause stock price volatility	3.43367	0.0396	Causality
Broad money	Exchange rates	Broad money do not cause exchange rates	2.70250	0.0763	No Causality
	exports	Broad money do not cause exports	1.57681	0.2162	No Causality
	Interest rates	Broad money do not cause interest rates	1.24547	0.2961	No Causality
	Stock price volatility	Broad money do not cause stock price volatility	0.11176	0.8945	No Causality
Exports	Broad money	Exports do not cause broad money	2.98238	0.0592	No Causality
	Exchange rates	Exports do not cause exchange rates	0.15832	0.8540	No Causality
	Interest rates	Exports do not cause interest rates	1.90159	0.1594	No Causality
	Stock price volatility	Exports do not cause stock price volatility	0.28927	0.7500	No Causality
Interest rates	Broad money	Interest rates do not cause broad money	0.68420	0.5089	No Causality
	Exchange rates	Interest rates do not cause exchange rates	4.75336	0.0126	Causality
	Exports	Interest rates do not cause exports	0.95384	0.3918	No Causality
	Stock price volatility	Interest rates do not cause stock price volatility	1.78030	0.1785	No Causality
Stock price volatility	Broad money	Stock price volatility do not cause broad money	0.93954	0.3972	No Causality
	Exchange rates	Stock price volatility do not cause exchange rates	0.34550	0.7095	No Causality
	Exports	Stock price volatility do not cause exports	0.41747	0.6609	No Causality
	Interest rates	Stock price volatility do not cause interest rates	0.49560	0.6120	No Causality

Source: Research Findings

From the table above, at 95% levels of confidence, the study finds that exchange rates causes export earnings, exchange rates causes' interest rates, exchange rates causes' stock price volatility and interest rate causes exchange rates. The study established that at 95% levels of confidence exchange rates have no causality effects on broad money. Also, broad money has no causality effects on exchange rates, exports earnings, interest rates and stock price volatility. The study noted that there is no evidence of exports earnings having any causal effects on broad money, exchange rates, interest rates and stock price volatility. Further, the study establishes that Interest rates have no causality on broad money, export earnings and stock price volatility. Stock price volatility has no causality effects on broad money, exchange rates, exports earnings and interest rates.

4.8 Interpretation of Findings and Discussions

The study finds that broad money had a mean of 28.08, export earnings had a mean of 24.50, exchange rates had a mean of 4.49, and stock volatility had a mean of 3.96 while interest rates had a mean of 3.96. The trend analysis indicated that there exists a significant variability and instability in all the variables which results to upward and downward movements. Unit root tests showed that data were co-integrated at level one and thus did not need to be analysed in a standardized form however Levin, Lin & Chu tests showed a contrary findings.

The study found out that the intercept for the regression model was 2.078 for the years. The study noted that variations in the predictor macroeconomic variables explained 10.6% of variations in stock price volatility. Broad money negatively influence stock price volatility (β=-0.183, $p>0.05$) and interest rates also negatively influence stock price volatility (β=-1.061, $p>0.05$). The relationships are however not statistically significant.

These findings were in line with Muradogalu and Metin (2001) who established that as the market became more mature the influence of money supply and interest rates disappeared. Further the study established that exports (β=0.066, $p>0.05$) and exchange rates (β=1.869, $p>0.05$) positively influences stock price volatility though the relationship is not statistically significant. The positive relationship is consistent with the findings of Attari & Safdar (2013) who showed that macroeconomic variables have a credible influence on the prices of stocks.

The study also established that the coefficient for broad money was 0.074; meaning that broad money had a weak positive effects on stock price volatility of firms listed in the NSE. The weak relationship may have been caused by the fact that an increase in the money supply leads to an increase in the discount rate and lower stock prices which are however countered by economic stimulus provided by money growth thus increasing cash flows and stock prices. The findings were in line with Mohammad et al. (2009) who revealed that money supply affected prices positively.

The study established that the coefficient for export earnings was 0.127, meaning that export earnings had a weak positively affects stock price volatility of firms listed in the NSE. The weak correction is an implication that fluctuations in export earnings can undermine the capacity of the country to import critical inputs thus affecting the stock prices in the NSE. This is in line with Stordel (1990) who found that. Export earnings fluctuation directly harms investment.

The study also established that the coefficient for interest rates was of -0.267, meaning that interest rates has a weak negative effects on stock price volatility of firms listed in the NSE. This may be because of lower interest rates increases stock prices while higher interest rates

reduces the flow of capital to the stock markets. This is in line with Adam and Tweneboah (2015) who showed that interest rate lagged have significant influence on stock market.

Further the study established that the coefficient for exchange rates was 0.240, meaning that exchange rates positively affects stock price volatility of firms listed in the NSE. A change in exchange rate could change stock prices because variations in exchange rates alter firms' profits which in turn affect stock prices. This is in disagreement with the findings of Ibrahim and Aziz (2003) who indicated that exchange rate was negatively associated with stock prices. Patra and Poshakwale (2006) who found that there was no short run or long run equilibrium relationship between the exchange rates and stock prices.

The study established that the collinearity statistics of broad money, exports earnings, interest rates and exchange rates had tolerance factors of 0.631, 0.508, 0.864 and 0.383 respectively. These meant that the four variables affect the stock price volatility of the firms listed in the NSE. This is in line with Fowdar and Koonjal (2011) who concluded that macroeconomic variables affect stock exchange.

Granger Causality tests with a lag of two months at 5% levels of significance show that exchange rates causes export earnings, exchange rates causes' interest rates, exchange rates causes' stock price volatility and interest rate causes exchange rates. The causality of exchange rates and stock price volatility confirms the findings of Aydemir and Demirhan, (2009) who showed a bi directional causality between exchange rate and stock market indices. The no causality relationships were in line with the findings of Choo, Lee & Ung (2011) who revealed that macroeconomic variables have no impact on the volatility stock markets.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the study, conclusion, recommendations, limitations of the study and suggestions for further research of the main findings on the relationship between macroeconomic variables and stock price volatility of firms listed in the NSE.

5.2 Summary of Findings

The study sought to establish the link between macro-economic variables and stock price volatility of firms listed in the NSE. The study adopted a causal research design and applied a multiple regression model on secondary data collected defines the connection between the dependent variable (stock volatility) and independent variables(broad money, export earnings, interest rates and exchanges rates).

The study revealed only a weak correlation between stock volatility and the variables. Stock price volatility had a weak positive correlation with broad money, exports earnings and exchange rates. The study indicated that stock volatility had a weak negative correlation with interest rates. The findings are inconsistent with the findings of Singh (2016) who established that the price of a stock positively relates to supply of money and interest rate however negatively relate to exchange rate. Also, those exchange rates are insignificant in determining stock prices and supply of money causes stock prices only in the long-run but not in short run.

The study revealed a very weak to strong correlation between the independent variables. Broad money had a moderate positive correlation with exports earnings and exchange rates while exports earnings had a strong positive correlation with exchange rates. Also, the study found that interest rates had a weak negative correlation with exchange rates and a very weak negative correlation with broad money and export earnings. The findings concur with Mukherjee and Naka (2002) who found a positive relationship between stock price and supply of money and industrial-production & rate of exchange. Hasan and Tarij (2009) who revealed the relationship of the rate of interest and the rate of exchange with equity market returns is negative. Bristy (2013) who concluded that the relationship between earnings on export and exchange rates are positive because the rate of exchange is an significant determinant of a countries earnings on export.

Further the study revealed that there was a weak association between the independent variables (broad money, export earnings, interests' rates and exchange rates) and the dependent variable (stock price volatility).The study found that the independent variables accounted for 10.6% of stock price volatility while 89.4% of stock price volatility was unexplained by the study. Also, the study revealed that there was a weak negative or positive first order autocorrelation amongst the model's residual values. From the F-Statistics, the study found that the independent variables were insignificant. This does not agree with the findings of Alam and Uddin (2009) who found that interest rates have significant negative relationship with share prices.

The study found that a unit increase in export earnings and exchange rates led to an increase in stock price volatility while a unit increase in broad money and interest rates led to a decrease in stock price volatility. Further the study revealed that broad money, export earnings, interest rates and exchange rates affect the stock price volatility of the firms listed in the NSE. Finally, the study revealed that two month lag exchange rates caused export earnings, interest rates and stock price volatility while two month lag interest rates caused exchange rates. This is contradicts with Choo, Lee & Ung (2011) who revealed that macroeconomic variables have no impact on the volatility stock markets.

5.3 Conclusions

The study concludes that macroeconomic variable influence stock price volatility of firms listed in the NSE positively or negatively depending on the nature of the variable. There are weak positive associations between stock price volatility and broad money, exports rates and exchange rates. Stock price volatility has statistically significant weak negative associations with interest rates.

The study concludes that broad money negatively influences stock price volatility, interest rates negatively influences stock price volatility, exchange rates positively influences stock price volatility and export earnings positively influences stock price volatility.

The study concludes that a two month lagged exchange rates causes' stock price volatility, export earnings and interest rates while two month lagged interest rates causes' exchange rates.

5.4 Recommendations

From the findings interest rates was seen to have a weak relationship with other variables the government of Kenya thus should put in place appropriate policy measures to ensure that the interest rates is stabilized. Also the government should seek to minimize fluctuations on the variables; broad money, interest rates, export earnings and exchange rates.

NSE should put in to place practices/strategies that will enable control of macroeconomic variables in order to moderate the stock price volatility consequently enhancing the stability and the efficiency of the stock market.

An in-depth study should be carried out on other variables that relate to stock volatility apart from those considered in the model specification.Local researchers and academicians should increasingly study the macroeconomic variables that influence stock price volatility to add on to the limited literature in Kenya.

5.5 Limitations of the Study

The study focused on four macro-economic variables as relating to stock price volatility in firms listed in NSE. The interpretations of the results as concerns to stock price volatility were thus restricted to the variables under study. Data was tedious to collect and compute as it was in its very raw form. Due to lack of standardization thus data computation was made even harder.

Time and resources allocated to this study was inadequate thus could not allow an in-depth analysis other macroeconomic variables that relate to stock price volatility for firms listed at the NSE. Another challenge was limited data availability and the uncertain quality of the data used.

The study was based on a five year study period from the year 2011 and 2015. Within this period many changes occurred in the stock market that the study did not account for. These unaccounted for issues may have in one way or another affected the outcomes of the study. Another limitation was developing a model which would enable a researcher to study the relationship between the various variables.

5.6 Suggestions for Further Studies

There is need for further studies to carry out similar studies on the relationship between macro-economic variables and stock price volatility on other companies not listed in the NSE.

This study was generalized to firms listed in NSE. Therefore further research should be carried out on specific sectors to look at the relationship between macro-economic variables and stock price volatility in other sectors such as tourism, manufacturing and construction.

Further studies can be undertaken to establish the relationship between stock price volatility and financial performance of firms listed in the NSE. Also further research should be conducted on the relationship between microeconomic variables (internal factors) and stock price volatility of firms listed in NSE.

REFERENCES

Adam, A.M. & Tweneboah, G., (2015). Do macroeconomic variables play any role in the stock market movement in Ghana? MPRA Working Paper No. 9368.

Aguiar, & Broner, (2006). Determining Underlying Macroeconomic Fundamentals During Emerging Market Crises: Are Conditions As Bad As They Seem? *Journal of Monetary Economics,* 53.4 (2006), 699-724.

Alesina, A, & Jeffrey, S. (1987). Political Parties and the Business Cycle in the United States, 1948-

Attari, M. I. & Safdar, L., (2013). The relationship between macroeconomic volatility and the stock market volatility: Empirical evidence from Pakistan. *Pakistan Journal of Commerce and Social Sciences,* 7(2), 309-320.

Aydemir, O. & E. Demirhan, 2009. The relation between stock prices and exchange rates: Evidence from Turkey. *International Research Journal of Finance and Economics*, 23, 207-215.

Bachelier, L. (1900). *Théorie de la spéculation*.Gauthier-Villars.

Bashir, A. & Hassan, A. (1997), Interest Rate Sensitivity and Stock Returns in the United Arab

Baskin, J. (1989). Dividend Policy and the Volatility of Common Stock. *Journal of portfolio Management*, 15 (3), 19-25.

Basu, A;. Calamitsis E.A & Ghura, D. (2000). Promoting growth in sub-Saharan Africa: learning what works. *Economic Issues No. 23. Washington, DC: IMF*.

Bitok, J., Kiplangat, A., Tenai, J., & Rono, L. (2011). Determinants of investor confidence for firms listed at the Nairobi stock exchange, Kenya. *International Journal of Finance and Management*, 1, 1–12.

Brains, C., Willnat, L., Manheim, J., & Rich, R. (2011). *Empirical Political Analysis* 8th edition. Boston, MA: Longman.

Brown, M. (2009). Investment Success. NY: Wiley and Sons.

Chris, B. (2008) Introductory Econometrics for Finance, 2nd edition.

Cunningham, L. A. (1994). Capital Market Theory, Mandatory Disclosure, and Price Discovery. *Washington and Lee Law Review*, *51*(3), 844–877.

Evans K., Nelson H. W. Wawire, P. & Onono, P.O. (2014). Macroeconomic Variables, Volatility and Stock Market Returns: A Case of Nairobi Securities Exchange, Kenya. *International Journal of Economics and Finance*; . 6,(8), 2014.

Fama, E. F. & Schwert, W. (1977). Asset Returns and Inflation. *Journal of Financial Economics*.

Fama, P. & French, M. (2012). *Firm size and growth in the United Kingdom, Life Insurance*

Granger, C.W.J, Huang, B., & Yang, C.W., (2000). A bivariate causality between stock prices and exchange rates: Evidence form recent Asian flu. *The Quarterly Review of Economics and Finance* 40: 337-354.

Gujarati, D. (2004). Basic Econometrics, Fourth Edition

Gupta, M. C. (1974). Money Supply and Stock Prices: A Probabilistic Approach. *Journal of Financial and Quantitative Analysis*, *9*(01), 57-68.

Habibullah, M.S., Baharumshah, A. Z. (1996). Money, output and stock prices in Malaysia: An application of the Cointegration Tests, *International Economic Journal*, X (2), 121-130.

Hawking, S. W. A. (1988). *Brief History of Time: From the Big Bang to Black Holes*. Toronto: Bantam Books.

Hazen, T. L. (1991). The Short Term-Long Term Dichotomy and Investment Theory: *Implications for Securities Market Regulation and For Corporate Law*, *70*, 137–207.

Hyde, S.J. (2007). The response of Industry stock returns to market, exchange rate and interest rate risks, *Managerial Finance*, 693-709.

Ibrahim, H.M. & Aziz, H. (2003), Microeconomic Variable and the Malaysian Equity Market, A View through Rolling Sub Samples, *Journal of Economic Studies*, 30(1), 6-27.

Joseph, N. (2002). Modelling the impacts of interest rate and exchange rate changes on UK Stock Returns. Derivatives Use, *Trading and Regulation*, 7,306-323.

Karungari, G.F (2006).The Empirical relationship between trading volumes and stock market Volatility at Nairobi Stock Exchange, Unpublished MBA Project. University of Nairobi.

Kenneth, J., & Dwight, R.W. (2011). Contrarian Investment, Extrapolation, and Risk. *Journal of Finance*, 49, 1541-1578.

Keran, M. W. (1971). Expectations, money, and the stock market. *Review*.

Mao, C. K. G., & Kao, W. (1990), On Exchange Rate Changes and Stock Price Reactions *Journal of Business. Finance and Accounting*, 17 (3), 441-449.

Markowitz, H.M., (1952). Portfolio Selection. *Journal of Finance*, 120-131.

Maskay, B. (2007). Analyzing the effect of change in Money supply on stock prices. *The park place economist*, 15(1), 72-79.

Maysami, R.C., Howe, L.C., & Hamzah, M.A. (2004). Relationship between macroeconomic Variables and stock indices: Cointegration Evidence from stock exchange of Singapore All-S sector indices, *Journal Pengurusan*, (24), 47-77

Mohammad, S.D., Hussain, A.M., Anwar, J.M. & Ali, A. (2009). Impact of macroeconomics variables on stock prices: Empirical evidence in case of KSE (Karachi Stock Exchange). *European Journal of Scientific Research*, 38(1), 96-103.

Mouradogalu, G. & Metin, K. (2001). Efficiency of the Turkish Stock Exchange with respect to Monetary Variables: A Cointegration Analysis, *Journal of European Financial Management*, 6459-478.

Munene, M. P. (2007). The Relationship between Inflation and Stock Prices - A Case Study of the NSE, Unpublished M.A Project Report, University of Nairobi.

Muriu, P.W. (2003). Volatility of Stock Returns: An Empirical Investigation of the Nairobi Stock Exchange. Unpublished Master Thesis. University of Nairobi.

Murungi, C. M. (2012). The impact of inflation on stock market returns and volatility Unpublished Master Thesis, University of Nairobi.

Nishat, M., Shaheen, R. (2005). Macroeconomic Factors and Pakistani Equity Market, *Pakistan Development and Economic review.*

NSE.(2011). Regulatory Framework. Retrieved August 1st, 2011, from Nairobi Stock Exchange:http://www.nse.co.ke/regulatory-framework/category/42-nairobi-stock-exchange-nse.html

Nyamute, M. N. (1998). Relationship between NSE Index and Major Macroeconomic Variables, Unpublished MBA Project Report, University of Nairobi.

Ochieng, D. E., & Adhiambo, E. O. (2012). The relationship between macro economic variables and stock market performance in Kenya. *DBA Africa Management Review*, 3(1), 38- 49.

Oehler, A., Walker, T, & Wendt, S. (2009). Effects of Election Results on Stock Price Performance: Evidence from 1976 to 2008. *Journal of political Economics*, 11, (18), 16.

Ologunde, A.O., Elumilade, D.O. and Asaolu, T. O. (2006). Stock Market Capitalization and Interest Rate in Nigeria: A Time Series Analysis. *International Research Journal of Finance and Economics*, 4, 154-166.

Olweny, T. & Omondi, D. (2011). Stock market performance and economic growth: Empirical evidence from Kenya using causality test approach. *Advances in Economics and Applied Economics*, 1(3), 153-196.

Omisore, I., Yusuf, M. & Nwufo, C.I. (2012). The modern portfolio theory as an investment

Omondi, K. & Olweny, T., (2011). The effect of macro-economic factors on stock return volatility in the Nairobi stock exchange, Kenya: *Economics and Finance Review*, 1(10),34 - 48.

Patel, S. (2012). The effect of macroeconomic determinants on the performance of the Indian

Patra, T. & Poshakwale, S. (2006). Economic Variables and Stock Market Returns: Evidence from Athens stock exchange. *Applied Financial Economics*, 16 , 993-1005.

Qundir, M.M. (2012). The effect of macroeconomic variables on stock returns on Dhaka Stock

Romer, D. (2012) Advanced Macroeconomics, McGraw-Hill Irwin

Ruth Bender and Keith Ward (2009) Corporate Financial Strategy. 3rd Edition

Shostak, F. (2003). Making sense of money supply data. *Ludwig von Mises Institute Daily Article. 17th December*.

Simon Kamau Gatuhi (2015). Macroeconomic Factors and Stock Market Performance In Stock Market Returns In Ghana: Any Causal Link? Asian Economic financial review. *Journal Homepage*: http://aessweb.com/journal-detail.php?id=5002

Stordel, H. (1990). Export income risk and determinants of capital formation in developing countries. *Review of World Economics*, WeltwirtschaftslicheArchiv, Band 126, Heft 2: 346-68.

Vaz, J.J., Ariff, M., & Brooks, R.D. (2008). Effect of Interest rate change on Bank stock returns, *Investment Management and Financial Innovations*, 5 (4), 221-236

Waithaka, S. M., Ngugi, J. K., Aiyabei, J. K., Itunga, J. K., & Kirago, P. (2012). Effects of Dividend Policy on Share Prices: A Case of Companies in Nairobi Securities Exchange.Prime *Journal of Business Administration.* ISSN: 2251-1261. 2(8), 642-648

Wang, L. (2010). Empirical Analysis of Macroeconomic Factors Affecting Stock Prices. *Orient Academic Forum*, 132-133.

Wei, Ch. 2006. Inflation and Stock Prices: No Illusion.

Were, M, Njuguna S. Ndung'u, AlemayehuGeda And Stephen N. Karingi (2002) *Kenya Institute for Public Policy Research and Analysis*, Discussion Paper No. 22 November 2002

Zikmund, W.G., Babin, J., Carr, J. & Griffin, M. (2012).*Business Research Methods, 9th ed*. London: Cengage Learning.

APPENDICES

Appendix I: NSE Listed Firms

Agriculture

1. Rea Vipingo Ltd.
2. Sasini Tea & Coffee Ltd.
3. Kakuzi Ltd.

Commercial and Services

1. Access Kenya Group
2. Marshalls E.A. Ltd.
3. Car & General Ltd.
4. Hutchings Biemer Ltd.
5. Kenya Airways Ltd.
6. CMC Holdings Ltd.
7. Uchumi Supermarkets Ltd.
8. Nation Media Group Ltd.
9. TPS (Serena) Ltd.
10. ScanGroup Ltd.
11. Standard Group Ltd.
12. Safaricom Ltd.

Finance and Investment

1. Barclays Bank of Kenya Ltd.
2. CFC Stanbic Bank Ltd.
3. Housing Finance Company of Kenya Ltd.

4. Centum Investment Ltd.

5. Kenya Commercial Bank Ltd.

6. National Bank of Kenya Ltd.

7. Pan Africa Insurance Holdings Co. Ltd

8. Diamond Trust Bank of Kenya Ltd.

9. Jubilee Insurance Co. Ltd

10. Standard Chartered Bank Ltd.

11. NIC Bank Ltd.

12. Equity Bank Ltd.

13. The Co-operative Bank of Kenya Ltd.

Industrial and Allied

1. Athi River Mining Ltd.

2. BOC Kenya Ltd.

3. British American Tobacco Kenya Ltd.

4. Carbacid Investments Ltd.

5. Olympia Capital Holdings Ltd.

6. E.A. Cables Ltd.

7. E.A. Breweries Ltd.

8. Sameer Africa Ltd.

9. Kenya Oil Ltd.

10. Mumias Sugar Company Ltd.

11. Unga Group Ltd.

12. Bamburi Cement Ltd.

13. Crown berger (K) Ltd.

14. E.A Portland Cement Co. Ltd.

15. Kenya Power & Lighting Co. Ltd.

16. Total Kenya Ltd.

17. Eveready East Africa Ltd.

18. Kengen Ltd.

ALTERNATIVE INVESTMENTS MARKET SEGMENT

1. A.Baumann&Co.Ltd

2. City Trust Ltd

3. Eaagads Ltd

4. Express Ltd

5. Williamson Tea Kenya Ltd

6. Kapchorua Tea Co. Ltd

7. Kenya Orchards Ltd

8. Limuru Tea Co. Ltd

Appendix II: Data Collection Template

Date	NSE 20 Share index	Exchange rate	Export earnings	Money Supply

Appendix III: Unit root Tests

Group unit root test: Summary

Series: LN_BROAD_MONEY, LN_EXCHANGE_RATES, LN_EXPORTS, LN_IRS, LN_STOCK_PRICE_VOLATILIT

Date: 10/21/16 Time: 18:30

Sample: 1 60

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0 to 3

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.50662	0.3062	5	291
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-3.52267	0.0002	5	291
ADF - Fisher Chi-square	43.0040	0.0000	5	291
PP - Fisher Chi-square	40.1855	0.0000	5	295

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Appendix IV: Granger Causality Tests

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LN_EXCHANGE_RATES does not Granger Cause LN_BROAD_MONEY	58	2.82968	0.0680
LN_BROAD_MONEY does not Granger Cause LN_EXCHANGE_RATES		2.70250	0.0763
LN_EXPORTS does not Granger Cause LN_BROAD_MONEY	58	2.98238	0.0592
LN_BROAD_MONEY does not Granger Cause LN_EXPORTS		1.57681	0.2162
LN_IRS does not Granger Cause LN_BROAD_MONEY	58	0.68420	0.5089
LN_BROAD_MONEY does not Granger Cause LN_IRS		1.24547	0.2961
LN_STOCK_PRICE_VOLATILIT does not Granger Cause LN_BROAD_MONEY	58	0.93954	0.3972
LN_BROAD_MONEY does not Granger Cause LN_STOCK_PRICE_VOLATILIT		0.11176	0.8945
LN_EXPORTS does not Granger Cause LN_EXCHANGE_RATES	58	0.15832	0.8540
LN_EXCHANGE_RATES does not Granger Cause LN_EXPORTS		3.98292	0.0245
LN_IRS does not Granger Cause LN_EXCHANGE_RATES	58	4.75336	0.0126
LN_EXCHANGE_RATES does not Granger Cause LN_IRS		5.27945	0.0081

LN_STOCK_PRICE_VOLATILIT does not Granger Cause LN_EXCHANGE_RATES	58	0.34550	0.7095
LN_EXCHANGE_RATES does not Granger Cause LN_STOCK_PRICE_VOLATILIT		3.43367	0.0396
LN_IRS does not Granger Cause LN_EXPORTS	58	0.95384	0.3918
LN_EXPORTS does not Granger Cause LN_IRS		1.90159	0.1594
LN_STOCK_PRICE_VOLATILIT does not Granger Cause LN_EXPORTS	58	0.41747	0.6609
LN_EXPORTS does not Granger Cause LN_STOCK_PRICE_VOLATILIT		0.28927	0.7500
LN_STOCK_PRICE_VOLATILIT does not Granger Cause LN_IRS	58	0.49560	0.6120
LN_IRS does not Granger Cause LN_STOCK_PRICE_VOLATILIT		1.78030	0.1785