DETERMINANTS OF STOCK RETURNS VOLATILITY OF FIRMS LISTED ON THE NAIROBI SECURITIES EXCHANGE: MODERATED BY TRADING VOLUMES

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

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DEDICATION

I dedicate this thesis to my parents, my lecturers and the entire Strathmore community.

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ABBREVIATIONS

ASE-Amman Stock Exchange

CBK-Central Bank of Kenya

CPI-Consumer Price Index

GDP-Gross Domestic Product

GSE-Ghana Stock Exchange

IDX-Indonesia Stock Exchange

JSE-Johannesburg Stock Exchange

KSE-Karaca Stock Exchange

KNBS-Kenya National Bureau of Statistics

MDH-Mixture of Distribution Hypothesis

MSE-Malayasia Stock Exchange

NSE in Kenya-Nairobi Stock Exchange

NSE in Nigeria-Nigeria Stock Exchange

SIAH-Sequential Information Arrival hypothesis

DEFINITION OF TERMS

Firm specific factors-refer to characteristics such as profitability, company size, growth potential, liquidity, on-debt tax shields, age and tangibility of a firm (Pathak & Chandani, 2023)

Macroeconomic theory-is a branch of economics that studies the behavior, structure, performance and policies of the economy on an overall or national scale the impact of a country's level of investment, consumption, trade balance and payments (Said, 2023).

Volatility-refers to the degree of dispersion of random variables (Bhowmik & Wang, 2020).

ABSTRACT

This study aimed at identifying the determinants of stock returns volatility. This study investigated the macroeconomic and firm-specific factors as determinants of share returns volatility of companies listed at the Nairobi Stock Exchange. The study focused on the sixty-two companies listed on the Nairobi Stock Exchange. Stock returns volatility is believed to be affected by some prime external environmental factors. The study was motivated by the dynamic and changing macroeconomic environment in Kenya. The study sought to investigate the unique firm characteristics that lead to the stock returns volatility. The study investigated GDP, inflation, interest rates and exchange rates as macroeconomic factors. It also investigated firm size, leverage, earning per share and dividend payout as the firm specific factors. The study also considered trading volume as a moderating factor ,liquidity and price earnings ratio as control variables. The study was grounded on the APT theory, signaling theory, MDH and SIAH theories. The investigation used descriptive correctional research design . The results confirmed the sensitivity of financial markets to changes in the broader economic environment. Inflation and GDP, however, showed inconsistent effects, suggesting that not all macroeconomic indicators are equally predominant in the short term. In addition, firm-specific factors such as financial leverage, firm size, liquidity, dividend payout and earnings per share were also important in explaining volatility patterns across companies. The moderating role of trading volume was validated. Higher trading volumes intensified the impact of certain macroeconomic and firm-specific factors on volatility. This suggested that investor activity and information flow amplify price reactions to shocks. This reflects the behavioral finance where market reactions are not only by fundamentals but also by market participation levels. The research findings are of significance to investors, investment managers, management of the listed companies and policy makers such as the government.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Volatility refers to the degree of risk or uncertainty in the movement of stock prices (Ahmad & Ramzan, 2016).Existence and differences in stock return volatility in the different stock exchanges around has been examined by various scholars. The existence of asymmetric and leverage effects in all BRIC countries stock market return was examined. The analysis also reported time varying long-run volatility component was more persistent in Chinese and Russian stock markets. The temporary effect of short-run volatility persistence was found in Indian and Brazilian stock markets. The empirical results further revealed that volatility shocks were persistent in all Bric countries stock markets revealing the changing pattern of volatility over time (Tripathy, 2017).An anlysis of E7(Emerging 7) and G7(Developed 7) for two sample periods-the financial criss of 2007-2009 and the global pandemic of 2019-2021 discovered that developing and developed markets reacted differently to these two financial crises.While emerging markets responded homogeneously to these two crises,developed economies behaved differently. Developed economies were more volatile and sensitive to the worldwide pandemic of 2019 than the financial crisis of 2008 (Al-Absy et al.,2024).

A study on the African stock markets revealed that volatility of these stock exchanges followed a dynamic process and is explained by past volatility ,domestic exchange rates,treasury bill rates,money supply,inflation rates,movemets in world crude oil prices,volatility of the USA and UK markets. A further analysis of pre-during and post-crisis periods,Global Financial Crisis and COVID-19 pandemic revealed that African stock markets became sensintive to advanced market volatility during the GFC period and have remained in the post GFC period.Past domestic market return volatility,treasury bill rates and exchange rates have been the main drivers of stock return volatility during the COVID-19 pandemic in Africa(Domeher et al.,2023). According to the NSE integrated report of 2022, majority of the trades were speculative in nature as investors looked to hedge their portfolios from increased volatility across the different asset classes. This NSE report of 2022 also indicated that the performance of the listed securities remained subdued in agreement with the global assets prices which were characterized by sharp price volatility. The NSE report of 2023 indicated that the exchange was seeking ways such as futures that would allow investors

hedge against market volatility. This indicates that stock prices volatility is a major issue especially for investors. The figure below shows the stock returns volatility, between 2019 and 2023,which are among the years of study.

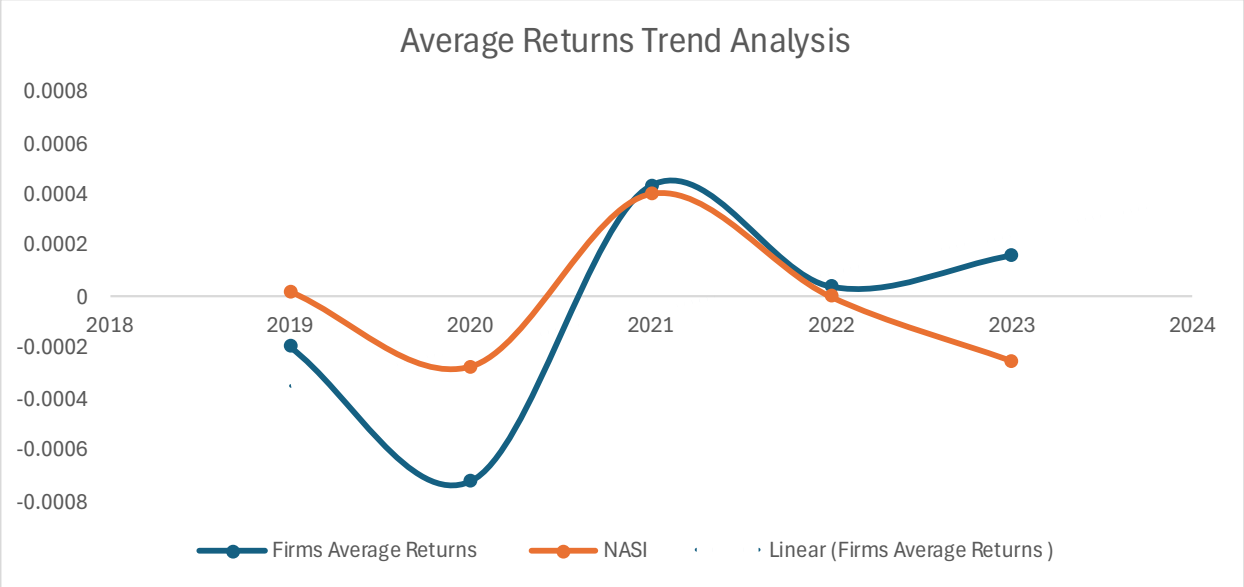

Figure 1. 1: Average Stock returns Volatility

It is general opinion that stock returns are dependent on share prices to be determined by factors in the external environment such as interest rates, money supply,inflation,exchange rate and gross domestic product(Onono et al.,2014).External (macro-economic) and Internal (firm-specific) causes of share price fluctuations are important for investors seeking to trade in a firm's stock (Salama *et al*., 2017).Numerous macroeconomic factors affect the outcome of the stock market . An analysis is paramount for both investors and companies,as it can influence returns and directly affect stock market prices. The relation between external environment factors and share yields has been a concern for researchers (Verma & Bansal, 2021). Recent research has recognized a number of firm attributes that predict future share returns. Even across industries ,there is compelling evidence of movement in the share firms with comparable characteristics that has to do nothing with their exposure to the market portfolio (Kogan & Papanikolaou, 2013).It has been established that macroeconomic factors and ,occasionally a public company's internal parameters can have an impact on share returns(Katarzyana, 2020).Investors erroneously assume that share price volatility is based on the overall direction of price movement. However, volatility refers to the magnitude of price fluctuations (Haider et al.,2017). Parab & Reddy (2019) share market discounts everything'.

This means that whatever occurrence occurs in an economy gets mirrored through the share market. Events could include changes in government policies, budget announcements, inflation and interest rates, currency appreciation or depreciation, recession or depression, natural disasters like floods, cyclones and draughts, or terrorist attacks, among other things. Not only these events but also events that are company-specific occurrences such as dividend announcements, the appointment of new directors or CEOS,mergers,amalgamation,acquisitions and both internal and external restructuring. The stock market serves as a measuring instrument ,reflecting the effects of these economic and financial events. Trading volume gives important understanding of the share behavior's price a share represents a balance between buy and sell orders. New information shapes investor opinions and trading volume serves as an indicator of the flow of information within the market (Hsieh, 2014).

1.1.1 Macroeconomic factors

Macroeconomic factors contribute to how shares are bought and sold in the stock market. They influence the stocks investors invest in as they affect the management of the investors' portfolios. Sudden changes and abnormal movements cause share returns to rise and fall due to unpredictability for future gains. Volatility in macroeconomic fundamentals exists either unidirectional or bidirectional (Ahmad & Muhammed , 2016).Establishing eventually interconnection between determined macroeconomic factors and share returns is of paramount importance. Macroeconomic variables are useful points of reference of a country's economic health. These variables ,in turn, affect the stock market, impacting its unpredictability(Jha et al.,2024).Share market behavior can be explained by effectual relationship between macroeconomic factors such as money supply, price and real output and shareholders responses to those variables(Yang et al.,2018).New entrances and changes in market expectations are among the significant stock market movers (Ngandu & May, 2023). The outcomes of external environment factors on stock returns differ depending on market condictions(Nguyen et al.,2024). Over the past two decades. Emerging economies have gone through financial markets and macroeconomic adjustments. Attaining macroeconomic stability has become crucial for both financial development and economic growth. Investment strategies and financial sector returns are significantly influenced by macroeconomic factors. As a result, fluctuations in the stock market can be (Adjasi, 2009).

A significant relationship was confirmed to exist between inflation for Austria, Belgium ,Canadian, Chilean, Chinese, French and Irish stock benchmark indices (Sathyanarayana & Gargesa, 2018).Inflation has an important relationship with stock returns ultimately and detrimental effects in the short run on the Indian Stock Market (Sreenu, 2023).Aba (2018)concluded that inflation does not have an important relation with stock returns being unstable on Indonesia stock market. However, a study examining the outcome of inflation on share market yields and volatility in Nigeria and Ghana found that both inflation rate and its three-month average had considerable impact on the share market volatility in the two countries (Aliyu, 2013).Research on the NSE indicated an important detrimental interconnection between inflation and performance of Equity Market (Simuyu et al.,2019).A similar study on the NSE in Kenya concluded a positive and important short run inflation run interconnection between inflation and stock market volatility(Muturi,et al., 2019).

A study on time-dependent effect of interest rates on stock returns in China indicated that interest rates had detrimental effect on stock price returns. However, interest rates follow time-varying pattern and typically have an unusual beneficial effect at market highs (Wang et al,2022). Interest rates have a detrimental and important outcome on dependent bank return on Turkish Stock Exchange (Tunc et al.,2011).However, research on Malayia and Singapore Stock Market suggested a close correlation between interest rates and stock market volatility. The results also showed a detrimental relationship with the stock market return, but the relationship is of little importance (Ariffin et al,2012). A study on the NSE in Nigeria concluded that interest rate had a detrimental association with stock market returns (Ozurumba et al.,2019). According to a study conducted on the Nairobi Stock Bourse, interest rates significantly increased the movements of the share prices of companies that trade on the NSE in Kenya. Movements of the share prices increased as the interest rates rose(Manyanga et al.,2023).

A study on the US stock market found out when key factors influencing financial volatility are accounted for, a higher exchange rate volatility has a positive and important consequence on stock return volatility(Kennedy & Nourzad, 2016).Further, an investigation on the Colombo Stock Bourse revealed that volatility of Euro Exchange rate had a positive and important outcome on ASPI return movements whilst the volatility of US dollars and British Pounds are found to have detrimental and insignificant impact. The overall findings highlighted that the exchange volatility

is also a key factor influencing stock market return volatility and it is important to take this into consideration when making investment decisions in the capital market(Peprah, 2016).A detrimental interaction between exchange rate ,inflation volatility and stock market prices was concluded on the NSE in Nigeria. The investigation also found a long-term correlation between Nigerian share returns with inflation and the exchange rate. Hence ,this results indicate the importance of exchange rate and price stability to the local economy and listed on the floor of the stock market (Nkoro & Uko, 2016).Sichoongwe(2018) concluded that a detrimental correlation linked exchange rate movements and share market yields on the Zambia Stock Exchange (Sichoongwe, 2016).An investigation on Nairobi stock Exchange showed that exchange rates volatility had an important effect on the share prices (Muigai & Cherono, 2019). This was also confirmed by a study on the financial firms listed on NSE,which concluded exchange rate affects the stock returns of Kenya's listed financial institutions (Koskei, 2017).

A study on Karachi(Stock Exchange) concluded Gross Domestic Product has no relationship with stock returns as they move toward independent direction (Attari et al.,2013).A study on the NSE in Nigeria also indicated GDP showed no connection with stock market price volatility (Oluseyi S. A., 2015)A study on the NSE in Kenya that Gross Domestic Product have an insignificant relationship with stock market returns (Onono et al.,2014).

Several scholars have investigated the correlation between money supply and stock returns. Volality of the share prices of companies quoted on different stock exchanges. An examination of the Korea Stock Exchange did not identify any interconnection between money supply and Volality in the Korean Stock Bourse. This proposed that movements in the Money supply had no direct repercussions on how information moves through the market. Stock returns and volatility are not directly related to changes in money supply (Choi & Seong-Min , 2015).However, a study on the NSE in Nigeria suggested that stock return volatility is negatively affected by broad movements in money supply (Kalu & Okwuchukwu, 2014). Mumo (2017) confirmed the existence of eventual inverse correlation between the money supply and share prices on the NSE in Kenya.

Other macroeconomic factors discussed in relation to stock returns volatility are economic growth and industrial output. Aggregate industrial production was concluded to positively and significantly affect stock returns on the NSE in Nigeria (Pole & Cavusoglu, 2021). Kumar & Tamimi (2011) did an investigation on the Indian Stock Market and concluded that high economic

growth tends to ensure stability in investment decisions and foster confidence among investors. However, a low growth rate makes their decisions highly volatile. Investors tend to be less worried about the economic growth rate over the short term, but their responsiveness increases with longer term invetsments.High volatility is associated with lower economic growth while low volatility is with higher economic growth (Kumar & Tamimi, 2011).

The macroeconomic factors discussed above are dynamic in nature as their end result on share returns and stock returns volatility. The Kenya macroeconomic environment has been characterized by changes over the last decade. This includes fluctuation in inflation rates, fluctuation in interest rates such as the treasury bill rates and fluctuation in exchange rate especially Kenya shillings against the United Stated Dollar. Prior investigations have been inconsistent ,in determining the outcome of the external-environment factors on share yields unpredictability.Hence,the need to investigate the same in Kenyan context.

1.1.2 Firm-specific factors

Capital Asset Pricing Model (CAPM) proposes that market beta is a complete measure of the assets' expected return and so no other factors should be important in describing differences in stock returns. In contrast to this prediction, empirical studies identify numerous attributes associated with actual returns. Such as firm size, financial leverage, earnings to price ratio ,book to market equity ratio and stock price momentum. These results suggest that undiversifiable risk may be more complicated than stated by the CAPM.Risk can be complex, and the above factors may forecast stock returns because they record a firm's subjection to fundamental risk extents that are ignored by CAPM framework, such as bankruptcy ,liquidity and information risks (Astakhov et al.,2019).

A study on the United States Stock Exchange concluded that market volatility feedback effect at the firm level is affected by both market-wide and company-particular factors.However,the effect of the market volatility feedback is stronger than that of company-level volatility feedback. The study also indicated that volatility feedback effects may be influenced by a firm's size and growth (Smith & Yamagata, 2011). Pertiwi & Waigustini (2020) conducted an analysis on manufacturing companies listed on the IDX and concluded that firm size significantly affects stock price volatility. A little of importance detrimental relationship was indicated linking firm size and share returns in Nigeria (Dagwom et al.,2018).Cashflow and leverage have an important consequence on stock

yields of non-financial listed companies in Kenya. The findings also suggested that when firm size is considered, the importance of both cashflow and leverage on the stock returns becomes stronger. Expanding a company's size by increasing its market share could enhance stock return performance(Oluoch et al.,2019).

An important detrimental relationship was established linking leverage and stock return incase all industrial data is used.However,at an individual company level the relationship was not consistent. Some indicated negative coefficients and others indicated positive coefficients on the Dhaka stock Exchange (Toohey et al .,2015).An examination on manufacturing companies trading on GSE established a detrimental and important relationship between leverage and stock return when overall industrial data was used.However,at the individual firm level the relationship was not stable. Some indicated negative coefficients and others indicated positive coefficients (Shibu,et al.,2014).Leverage was found to have a positive and significant effect on stock return on NSE in Kenya (Nasieku et al.,2019).

An important detrimental relationship was established between share price volatility and the two primary assessments of dividend policy which are dividend yield and dividend payout on Malaysia Stock Exchange (Younesi et al.,2012). An important positive relationship existed between share price volatility and dividend yield. Dividend payout was not a major factor but it showed a positive correlation with the movements in stock prices on the Colombo Stock Exchange (Athambawa & Mulafara, 2016).Dividend payout and dividend yield were found to be important factors in predicting volatile movement in stock price in the Nigeria, Kenya and South Africa (Ajao & Robinson, 2022).

Other firm specific factors such as turnover, book to market ratio profit, cash flow, board size, firm type ,current ratio, return on equity and return on capital employed are studied in relation to influence on share price volatility and share return volatility. For example, in a study on Pakistan Stock Exchange concluded that book to equity was the best indicator in that market although the relationship was not strong(Muddasier et al.,2015).

The studies reveal unique effects of these firm specific characteristics on stock returns, stock returns volatility and share price volatility. These factors are also discussed to be significant and insignificant depending on stock market country and different sectors and individual firms on the different stock exchanges .NSE in Kenya has thirteen sectors, an analysis of these firm specific

characteristics on the overall market and to some specific firms in the different sectors show a clear picture of these effects on the stock returns and stock returns volatility.

1.1.3 Trading Volumes

Rahman and Bose (2015) state that in an asset market with frictions(presence of trading cost) trading volume is important and price only is not adequate to explain the nature of the market. Trading volume can be looked at as a reflection in financial markets and information trickles being the driving force behind the price or return volatility. Trading volume is seen as a stand in for assessing the movement of information since it is not possible to observe information firsthand. Although increasing trading volume helps investors generate returns, it also increases volatility (Kao et al.,2018).The ASE's return movements were notably affected by the trading Volume, putting into question the validity of MDH in ASE (Anane et al.,2013).

According to an investigation on the JSE,there was a strong association between trading volume and market movements, which supported the MDH.Even after the addition of the trading volume as an explanatory element to the volatility model, volatility remained very persistent. Trading volume had no effect on the degree of movements persistence for the whole sample (Naik et al.,2018).When trading volume was included as an explanatory variable in the conditional variance equation, volatility persistence was reduced, after an examination of the top twenty(20) Tunisian equities that traded on the Tunis stock market (Boubaker & Makram, 2011).

The connection between trading volume and stock returns is positive but does not have statistical significance suggesting that trading volume is substitute for information flow and can be is generally not a strong indicator of volatility in stock returns.However,the results supported the hypothesis that persistence in volatility disappears with the incorporation of trading volume in conditional variance equation (Moyo et al.,2018).

1.2 Problem statement

In the past few years Nairobi stock Exchange has experienced drastic volatility in its performance (Gichungu & Mukoma, 2024).According to the NSE integrated report of 2022,majority of the trades were speculative in nature as investors looked to hedge their portfolios from increased volatility across the different asset classes. This NSE report of 2022 also indicated that the

performance of the listed securities remained subdued in agreement with the global assets prices which were characterized by sharp price volatility. The NSE report of 2023 indicated that the exchange was seeking ways such as futures that would allow investors hedge against market volatility. This indicates that stock prices volatility is a major issue especially for investors.

The persistence of stock returns volatility has a major effect on future volatility of the market when shocks occur (Owidi & Waweru, 2016). Stock returns influence financial risk which determines the cost of capital, investors' participation and volume of transactions. This may potentially have severe consequences on economic growth and development(Pole & Behiye, 2021).Volality is among the key features of financial markets. It is closely tied to market uncertainty and affects behavior of both businesses and individuals (Bhowmik & Wang, 2020).Investigating the co-movement of economic fundamentals ,firm characteristics, has become a key area of focus in driving faster growth for both the country and its stock market (Menike et al.,2015). Kenya being one of the emerging economics ,its stock market performance is particularly associated with the characteristics of the factors of the external environment. These factors are examined as the sources of stock return fluctuation in NSE in Kenya and may lead to a stock market crisis (Baariu & Jagongo, 2022).

Why stock returns fluctuate overtime continue to be a problem since it was first highlighted by Schwert in (1989).When stock prices reach extreme levels ,the consequences can be adverse. Incase volatility persists, companies struggle to utilize the available capital effectively due to the need to put aside a greater percentage of cash-equivalent of cash-equivalent to re-assure lenders and regulators. High volatility discourages investors from holding stocks. They must balance the expected returns with the risks they are exposure to leading to a higher demand for risk premiums to compensate for the volatility risk (Ndwiga & Muriu, 2016).

While extensive research has been conducted to examine return volatility ,most studies have focused on developed stock markets hence limited literature on emerging markets.Futhermore,findings on whether the effect persists after incorporating trading volume into the conditional variance of GARCH model have been inconsistent. The NSE Index (NSE20) exhibited positive and statically significant results when volume was incorporated in GARCH. Stock return volatility tends to rise as the frequency of information events increases(Simwa et al 2021).Bose & Rahman (2015) referenced a study by Girard and Oman(2009),who found a

negative relation between the expected aspect of the trading volume and return volatility on the Cairo and Alexandria stock markets.

This investigation aimed to not only analyzed the macroeconomic factors on the stock returns volatility but also the firm specific factors effect on the stock returns volatility of the firms listed on NSE in Kenya. Trading volume was introduced as a moderating variable to clearly bring out the effects of the macroeconomic variables and firm specific factors on stock returns and stock returns volatility. The trading volume was also introduced as a moderating variable to identify clearly if it affected stock returns' volatility and to what extent.

1.3 Research Objectives

The general objective was to investigate macroeconomic and firm specific factors as determinants of stock return volatility moderated by trading volumes among listed firms on Nairobi Securities Exchange, Kenya.

1.3.1 Specific Objectives

i. To determine the effect of macroeconomic factors on stock returns volatility on firms listed on NSE, Kenya
ii. To investigate the effect of firm-specific factors on stock return volatility on firms listed on NSE, Kenya
iii. To access the moderating effect of trading volumes on stock return volatility on firms listed on NSE, Kenya

1.4 Research Questions

i. What is the impact of macroeconomic factors on stock returns volatility of firms listed on NSE, Kenya?
ii. What is the impact of firm-specific factors on stock returns volatility of firms listed on NSE, Kenya?
iii. What is the impact of trading volume as a moderating factor between macroeconomic factors, firm specific factors and stock returns volatility on firms listed on NSE, Kenya?

1.5 Scope of the study

This investigation focused on companies listed on the Nairobi Bourse between 2013 to 2023.The year 2024,was not be included in this study as most listed firms are unlikely to have published their statements for 2024.During this period, major macroeconomic changes were experienced. There was the global Pandemic experienced between 2020 to 2021.Kenya has undergone major macroeconomic changes during this period such as change of governments in power and new tax regulations.

1.6 Significance of the Study

1.6.1 Investors

This study would help investors in the stock exchange to understand how different sectors and individuals' stock performances are affected by the different macroeconomic factors. It also helped the investors comprehend how unique firm characteristics impact the performances of the different stocks. As past analysis of the stock performance helps predict the performance of the different stocks under similar environmental condictions both in the external and internal environment in the future. This will aid in the portfolio formation and portfolio rebalancing by the various investors.

1.6.2 Investment managers

This study would help investment managers to provide investment advice to their clients on the formation of their portfolios. As stated earlier past analysis of the performance of the stocks helps predict the future performance of the stocks in similar environmental condictions. The investment managers hence provide credible advice to their clients. It helped also the investment managers provide alternative portfolio combinations to facilitate diversification and help the investors hedge especially the negative effects of the stock returns' volatility.

1.6.3 Firms listed on the Nairobi Stock Exchange

This study would help management of the listed firms understand how the different macroeconomic factors affect the stock returns' performance.Further,it will help management understand how the different internal decisions are likely to affect the stock returns performance.

This will be from, for example by comparing high-leveraged firms stock returns performances to low-leveraged firm stock returns performance.

1.6.4 Policy makers

This study would help policy makers understand how the various macroeconomic factors effects are reflected on the Nairobi Stock Exchange. This will help the policymakers formulate policies with a positive impact on the stock returns performance of the firms listed on the Nairobi Stock Exchange.

1.7 Chapter Summary

This first chapter gave an insight into the background of the macroeconomic factors and firm specific factors evaluated as determinants of stock return volatility. The chapter also highlighted the objectives of the study. The significance and scope of the study is also discussed.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter explains the theories and empirical review of literature about the relation between macroeconomic factors, firm specific factors and stock returns volatility on listed firms. It focuses to deliver a complete understanding of the current state of knowledge on how various macro-economic factors, firm specific factors and trading volume affects stock returns volatility on firms listed on NSE in Kenya.Further,the chapter presents a conceptual framework, operationalizes the study variables, and identifies research gaps in existing literature to provide a foundation for understanding the effects of macroeconomic factors, firm specific factors and trading volume on share returns of companies trading on Nairobi Stock Bourse.

2.2 Theoretical Framework

The theoretical Framework examines the existing body of literature and establishes a connection between stock returns, stock returns volatility, macroeconomic factors, firm-specific factors and trading volume. Theories underpinning this study were highlighted based on previous reviews mentioning their strengths and limitations. The study used arbitrate pricing theory,signalling theory, Mixture of Distribution Hypothesis(MDH) and Sequential Arrival Information Hypothesis (SIAH).The choice of multiple theories offered a comprehensive framework for analyzing the study variables from different angles. Each theory brings a different perspective. This strengthened validity if the findings of the theories converge on a similar conclusion. Using one theory in a study may provide a limited perspective of the study and result in potential biasness where the researcher tends to select data that met their interest.

2.2.1 Arbitrage Pricing theory

The Arbitrage Pricing Theory(APTO was developed by Stephen A Ross in 1976 to deal with the weakness of CAPM. Unlike CAPM, which relies on a single market index to explain the relationship between risk and expected return. APT incorporates numerous factors to provide a more complete assessment of this relationship. Ross stated that the expected return variation is brought about by changes in GDP,inflation,term structure and other macroeconomic factors

(Kisman & Restiyanita , 2015). A weakness of the APR is that theory does not specify which factors to use (French, 2017).

A study was conducted on the Athens Stock Market (ASE) market to substantiate the APT model and to examine if the APM is valid for the Greek Capital Market. The study concluded that macro-economic factors the Athens Stock Market. Among the selected macroeconomic variables only one is the exchange rate that significantly affected stock returns. The testing of the APT was supportive under the APT assumption. The assumption of the APT Theory says that the APT model identifies the relevant common factor, which strongly influences and explains the stock return (Khudoykulov & Khudoykulov, 2017).A study on the Indonesia stock market revealed that risk on inflation and the risk of the GDP rate had a positive but not important effect on the value of stock returns. APT explained 32% of the sources of the stock price movements. APT is still acceptable for use as an asset pricing model because it explained more than 30% of the stock price peculiarities on the IDX(Sutejo et al.,2019).

Arbitrage Pricing Theory is relevant to the study of the macroeconomic factors as determinants of stock returns volatility for the firms listed on the NSE in Kenya. The theory will help explain the extent to which the different macroeconomic factors are determinants of the stock returns volatility of the companies listed on the NSE in Kenya. Further, it helped explain how the different sectors and individual firms stock returns volatility is determined by the different macroeconomic factors.

2.2.2 Signaling Theory

Signaling theory, developed by Michael Spence in1973,suggests that employers often encounter challenges accurately assess the abilities of job applicants. However ,they can deduce the anticipated level of an applicant's ability based on their education or professional qualifications.Likewise,applicants can deliberately send positive signals to increase their like hood of getting the job. The theory is dependent on the idea of information asymmetry among market participants and aims to address the market failures resulting from this imbalance(Pennings et al,2024).This signal takes the form of details regarding the actions taken by management to protect the rights of shareholders. Promotions and other statements that the company is better than its competitors are an example of that signal.Signalling theory describes how management communicates with investors about their opinions about the company's future prospects.

According to the empirical data, investors respond favorably to dividend initiation and increases. Around the time of the divided initiation announcement stock prices of companies that start paying dividends typically rise.Similarly,the signaling theory suggests that financial markets will be extremely unhappy with any future reduction of dividends (Hobbs & Schneller, 2015). A study on the IDX found that stock prices were positively and significantly affected by financial ratios measured by the current ratio, return on equity, return on assets and earnings per share(Adam et al,2023).

Signaling theory is related to this study as it analyzed some of the financial ratios that influence the stock returns volatility of the trading on NSE in Kenya. These financial ratios included factors such as dividend announcements and leverage.

2.2.3 Mixture of Distribution Hypothesis and Sequential Information Arrival Hypothesis

The theoretical foundation of volume and volatility relationships can be traced back to the Mixture of MDH introduced by Clark in 1973 or SIAH developed by Copeland in 1976.The MDH states that the flow of information drives daily price movements, and that above-average trading activity is usually activated by unexpected news. The MDH indicates that there is now a positive correlation between trading volume and volatility of stock returns. While SIAH looks at the direct connection that MDH suggested but states that each trader interprets information trickles differently, resulting in a number of incomplete equilibria. Both MDH and SIAH agree that trading volume may be used to predict market price movements, and they both show volume and volatility are positively correlated (Padhi et al.,2018).

A test of the MDH on the Russian Stock Market ,provided evidence in support of the MDH.It suggested that even in emerging and turbulent market risks and returns are jointly integrated to the flow of information arriving to the market (Canarella & Pollard, 2011).Contrary to the SIAH and MDH suggestions, an investigation on the daily trading volume of JSE,there Borsa Istanbul 100,the CAC-40(the French Stock Market Index) ,the DAX(the German blue chip companies) and the NASDAQ index disclosed no important correction link of realized volatility and trading volume with the exception of CAS 40(Enow, 2023).

The two theories MDH and SIAH are applicable for this study as the trading volume is considered as a moderating variable. The introduction of the trading volume to determine if it affects to the stock returns volatility of the firms listed on the NSE in Kenya.

2.3 Empirical Review

This section reviews the existing research on the topic of stock returns volatility as determined by macroeconomic factors , firm specific factors and trading volumes.

2.3.1 The effect of macroeconomic variables on stock returns volatility

Since the 1980s,Kenya has experienced an unstable macroeconomic environment brought about by issues of political uncertainty. Macroeconomic instabilities have impact on economic growth and development. Empirical studies suggest certain macroeconomic factors are reflected in stock market prices(Mumo, 2017). Since external environment factors movements affect businesses' cashflows and have the possibility to affect the risk-adjusted discount rate,these factors are candidates to explain movements in stock values(Urbanek et al.,2019).From the literature review, various macroeconomic factors such as exchange rate ,interest rates,inflation,exchange rates (Olweny & Omondi, 2011),money supply, aggregate industrial ,exchange and inflation rate (Pole & Behiye, 2021) have been discussed as factors affecting stock returns volatility. This study will investigate GDP, interest rates, inflation rates and exchange rates as macroeconomic factors determining stock returns volatility of the firms listed on the Nairobi Stock Exchange. These macroeconomic factors were the most realistic in relation to the Kenyan macroeconomic environment.

2.3.1.1 Gross Domestic Product(GDP) and stock returns volatility

Research on the ASE using SPSS stated that GDP had a direct and strong relation with returns of stock. As GDP goes up the returns will rise and if there was a decrease there was an indication of the reduction on the returns (Qudah et al.,2023). A Study on the Pakistan Stock Exchange used the EGARCH to observe volatility and granger causality was used to verify causality among the variables. The findings of the research on causality indicated that there was no connection between GSP and stock returns ,as both variables seemed to move in independent directions(Luqman et al.,2013).A study on the Malaysian stock exchange using GARCH (1,1)models to estimate

volatility and regression analysis and a bi-variate,multivariate VAR Granger causality test were used to examine the interconnection between market volatility and external environment factors volatility, It was determined that there was no Granger -caused correlation between GDP volatility and stock market volatility(Zakaria & Shamsuddin, 2012).Similiarly, panel data regression analysis was used in an investigation on the East Africa stock market. According to the investigation, a rise in stock return was correlated with an improvement in GDP.GDP and share returns in the East Africa Stock market were significantly positively correlated (Kaunyangi & Obwogi, 2015).

KNBS releases quarterly announcements on GDP. The reports provide a detailed analysis of the Kenya's GDP growth rate for a specific quarter. The reports also indicate the changes in the various sectors. Some of these sectors have firms trading on NSE. A study on NSE in Kenya indicated that GDP has an insignificant consequences on the bank stock returns using the Ordinary Least Squares(OLS) under Fixed Effects Model (Mugambi & Okech, 2016).A study on the NSE in Kenya using the TGARCH and Engle-Granger two step method indicated that Gross Domestic product showed an insignificant relationship with stock returns (Onno et al.,2014).The Study was expected to conclude a significant relationship between Gross Domestic Product and stock returns volatility.

2.3.1.2 Inflation and stock returns volatility

A study applied ADF and ran Pearsson correlation coefficient connecting inflation and stock returns. An important interconnection between inflation and stock returns for Austrian index (ATX), Belgium Index (BEL20), Canadian Index (GSPTSE),Chile Index (IPSA), Chinese Index (SSEC), France Index (FTHI), Indonesian Index (JKSE) and Japanese Index(Nikkei) with negative relationship. However, for Ireland (ISEQ), Mexico (MXX), Spain (IBEX) and Turkey(XU100.ES) it was a negative correlation coefficient without any statistically important relationship (Sathyanarayana & Gargesa, 2018).According to an investigation on KSE using the GARCH models and the Vector Auto regression model, there was a notable correlation between movements in share returns and inflation movements as measured by CP1.Further,it revealed that movements in inflation had an effect on the stock index, which sequentially caused movements in stock returns (Ahmad & Muhammed , 2016).A study on the Malaysia Stock Exchange using the generalized least squares (GLS) proved inflation to be one of the key factors in swaying the results of stocks

in all sectors. Inflation was positively related to stock returns volatility (Pinjaman & Aralas, 2015).However, a study on the IDX showed that the inflation factor did not remarkably impact the volatility of the composite stock price Index using the multiple regression analysis (Amalia et al.,2020).A similar study on the JCI, agriculture and basic industry sector indicated a notable relationship occurred between inflation and stock prices of these industries. The change in inflation had a positive influence on the share price of these industries (Astuti et al.,2018).

A study on the NSE in Nigeria using the GRACH-X model suggested that NSE return volatility is negatively by variations in inflation (Emenike & Okwuchuchukwu, 2014).A similar study on the NSE in Nigeria employed the GARCH (1.1) inflation had different results that inflation had a positive interrelation with stock market returns (Ozurumba et al.,2019).A study on the GSE using Ordinary Least Square Estimation(OLS) revealed there was a positive worth of attention connection between stock market returns and consumer price index(inflation) (Owusu-Nantwi & Kuwornu, 2011).Similiarly,a study on JSE found that inflation had a positive relation with stock price in the long run using the cointegration tests (Tursoy et al.,2018).A study on the East African Community stock market using the panel data regression analysis disclosed that increase in interest rates had a percussion on stock returns in East African stock market (Kaunyangi & Obwogi, 2015).

Inflation in Kenya is measured using the Consumer Price Exchange. Inflation in Kenya always experiences a fluctuating trend in Kenya. A study on the NSE in Kenya using EGARCH and TGARCH indicated that inflation affects stock return volatility (Olweny & Omondi, 2011). Ouma & Muriu (2014),on a study on the NSE in Kenya using the Ordinary least squares concluded inflation affected stock market returns in Kenya. Inflation was found to be a weight determinant of the returns at NSE.Onono et al.,(2014) using the TGARCH model indicated inflation and stock returns have an unimportant relationship. The study is expected to conclude a remarkable relationship between inflation and stock returns movements.

2.3.1.3 Interest rates and stock returns volatility

A study on the KSE based in the GARCH models and the Vector Auto regressive model indicated that rising and falling of real interest rates did not have a relationship with the movement of share indices (Ahmad & Muhammed , 2016). An investigation by Khan et al.(2018) compared the effects of exchange rates on firms listed the US and Pakistan. Using the EGARCH model,

evidence of asymmetry and leverage effects are found. The risk-free rate had positive and negative effects on stock returns volatility for most firms in the NYSE and PSX markets respectively. A study on the JCI, agriculture and basic industry sector indicated a consequential relationship took place between interest rates and stock prices of these industries. The change in interest rates had a disadvantage on the stock price of these industries (Astuti et al.,2018).

Research conducted on the Dhaka Stock Exchange using the theory of Cointegration and Error Correction Model and analysis of Variance Decomposition. Casual relationships were scrutinized using the Granger Causality Test.The Granger Causality analysis proposed that there was a one-way causal relationship, where the market index influenced the exchange rate . The outcome of the analysis disclosed that eventually the interest rate had a negative impact on stock prices and the coefficient of the explanatory variable was found meaningful (Muktadir-al Mukit, 2012).A research examined the effects of interest rates volatility on stock market returns in Malysia and Singapore. Two separate GARCH(1,1)models were used on Malaysia and Singapore. The results suggested that interest rate volatility has a negative relationship with the stock market return, but the relationship was insignificant (Ariffin et al.,2012).

An investigation on the Ghana Stock Exchange using the OLS indicated treasury bill rate did not have any important outcome on stock market returns (Owusu-Nantwi & Kuwornu, 2011).A study on the JSE in South Africa found that interest rates had a positive interconnection with stock price in the long run using the cointegration tests (Tursoy et al.,2018). In contrast, a study on the NSE in Nigeria employed the GARCH (1.1) interest rate was found to have a detrimental relationship with stock market returns (Ozurumba et al.,2019).

Treasury bill rates in Kenya are set are by the Central Bank of Kenya. Treasury bill rates are issued in the maturities of 91,182 and 364 days. A study on the NSE in Kenya using EGARCH and TGARCH indicated that interest rate affects stock return volatility (Olweny & Omondi, 2011). However,Ouma & Muriu (2014),on a study on the NSE in Kenya using the Ordinary least squares concluded interest rates are immaterial in affecting long run returns on the NSE in Kenya. A study on the 20 NSE share index in Kenya using descriptive and inferential statistics indicated that interest rate has an important positive effect on share price volatility(Manyanga et al.,2023).The study was expected to conclude a noteworthy relationship between interest rates and stock returns volatility of the firms listed on the Nairobi Stocks Exchange.

2.3.1.4 Exchange rates and stock returns volatility

An investigation by Khan et al.(2018) differentiated the effects of exchange rates on firms listed the US and Pakistan. Using the EGARCH model, evidence of asymmetry and leverage effects are found. There is a negative interconnection observed between the exchange rate and the stock return movements of the majority of firms in both stock markets. A study on the MSE using the generalized least squares (GLS) proved exchange to be one of the key elements in contributing to the performance of stocks in all sectors. Exchange rate was positively related to stock returns volatility. The stock returns volatility was measured using EGARCH and it continued in influencing future stock returns performance across all economic sectors (Pinjaman & Aralas, 2015).A study on the IDX using the multiple regression analysis showed that exchange rate significantly influenced the volatility of the composite stock price Index(Amalia et al.,2020). A study on the Jakarta Stock Exchange indicated a significant relationship occurred between exchange rate and stock prices of these industries(Astuti et al.,2018).However, research on the Indian Stock exchange using the Granger Causality established that there was unidirectional causality between stock returns and exchange rates. If there was an increase in the returns of Nifty then there was a decline in the exchange rate (Najaf & Najaf, 2016).

A study on the NSE in Nigeria using the GARCH-X model suggested that NSE return volatility is positively influences by US dollar/naira exchange rates (Emenike & Okwuchuchukwu, 2014). Similar research on the NSE in Nigeria found that exchange rate volatility can be transferred to stock return volatility and that there was a long-term correlation between stock return volatility and external environment instability (Okonkwo , 2019).). A study on the NSE in Nigeria employed the GARCH (1.1) exchange rate was found to have a positive interconnection with share market returns (Ozurumba et al.,2019).However, a study on the Ghana Stock Exchange indicated that exchange rates did not have any significant effect on the stock returns using the OLS (Owusu-Nantwi & Kuwornu, 2011). A study on the JSE in South Africa found that exchange rates had a negative relationship with stock price in the long run using the cointegration tests(Tursoy et al.,2018).Similiarly,a inversely significant association between exchange rates and share returns was found in an investigation on the East African stock market that used panel data regression

analysis .Hence, a rise in the exchange rate reduced the returns on shares in the East African stock market (Kaunyangi & Obwogi, 2015).

The CBK published the exchanges, which are supposed to assist people who are trading currencies in determining the value of the shilling on any particular day. The exchange rate is not determined by the CBK.It is decided by considering the supply and demand of foreign currency. Indicative currency rates are released by the CBK(Olweny & Omondi, 2011).A study by Onono et al.(2014) using the TGARCH and the Engle-Granger Two step method revealed an important interconnection of exchange rate and stock returns. Ouma & Muriu (2014),on a study on the NSE in Kenya using the Ordinary least squares concluded exchange rates affect stock market returns in Kenya. Exchange rates were found to have a detrimental effect on share returns. The study was expected to conclude an insignificant interconnection between exchange rates and the volatility of stock returns of the companies trading on Nairobi Stock Bourse.

2.3.2 The effect firm Specific factors on stock returns volatility

Companies can be differentiated from each other based on distinct financial and non-financial characteristics including, firm value, cash flow, earnings per share ,leverage, firm size and firm structure among others. These elements are distinctive to each company and provide valuable insights to stakeholders about the company's performance and future prospects(Muriungi et al, 2019).

Various firm specific factors have been discussed to affect stock returns, stock returns volatility and share price volatility by various scholars. These factors include dividend policy, leverage ,firm size, firm growth rate ,earnings volatility, and earnings per share. This study will investigate dividend policy considering dividend payout,leverage,firm size, and earnings per share as firm specific factors affecting stock returns of firms listed on the Nairobi Stock Exchange. The Price/earnings ratio and liquidity ratio were considered as control variables. The price earnings ratio shows the relationship between stock price and Earnings Per share(Zaman & Arsalan,2014).Macharia et al.,(2019) employed a dynamic panel data regression and found there was a negative and significant relationship between liquidity and idiosyncratic volatility of stock returns among listed firms in Kenya.

2.3.2.1 Dividend policy and stock returns volatility

Research on the Malaysian stock market was done using the regression model by using control factors including size, earning volatility,leverage,debt, and growth. This investigation indicated an important detrimental link of share price volatility with the primary evaluations of dividend guidelines which are dividend yield and dividend disbursment.Additionally,there was a strong inverse correlation between size and share price volatility. The investigation deduced by stating that dividend yield and size have the most impact on share price volatility among other predictor variables(Younesi et al.,2012).Using multiple regression analysis a study on the UK stock market established that there was an important negative correlation between the payout ratio of a firm and the volatility of its share price and a negative relationship between dividend yield and volatility of stock price. The firm size,earnings,debt level and growth rate were the control variables that were used to demonstrate their ability to explain movement in stock prices. Size and debt were the control factors that most strongly correlated with price volatility. This indicated that larger firms tend to have stable share prices. Price volatility and firm size were significantly correlated negatively. This suggested that the share prices of larger firms are typically stable. However, it showed a remarkable positive relationship with price volatility. In contrast, debt showed a worthy of attention relationship with price volatility. This suggested that higher leverage is likely to lead to greater stock price movements (Chijoke-Mgbame et al.,2011).A investigation on the Pakistan Stock Exchange using multiple regression analysis found a negative relationship between Stock price volatility and dividend payout and dividend yield after controlling for firm size, asset growth, long term debt ,earning volatility and earnings per share. The study also found a significant positive relationship between control variables(asset growth, earning volatility and earnings per share) (Shah & Noreen, 2016).

A study on the manufacturing firms listed on the CSE of Sri-Lanka divulged that the dividend yield of the current year has a negative impact on the share price volatility while the dividend payout of both current and previous years had a positive impact (Samarakoon et al.,2015). A study on the Indian Stock market using the multiple least squares regression analysis showed that dividends affected stock price variations (Mohammad et al.,2019). A study on the Dhaka Stock Exchange using correlation and multiple regression analysis conveyed diverse findings between the measures of dividend policy(dividend yield and payout ratio) and their impact on share price volatility. The dividend yield became visible negative and significant while the payout ratio appeared positive and of little importance. Among the control variables included in the model, the

size of the firm had a significant negative impact on the share price volatility. On the other, both debt and earning volatility got positive but insignificant results on the share price volatility (Mishu et al.,2018).

A study on JSE stipulated that the connection between share volatility and dividend yield was positive and important but the that between share price volatility and the payout ratio was of little importance (Pelcher, 2019). A study at the DSE concluded a positive correlation between dividend payout ratio and stock price volatility (Daniel , 2024).A study on the NSE in Kenya establish the connection between dividend payout and stock price volatility of listed Commercial banks in Kenya incorporating size as a control variable found a negative relationship between dividend payout ratio and stock price volatility.Similiary,the relationship between dividend yield and stock price was insignificant. When the company is small, the dividend payout tends to have a detrimental influence on stock price volatility and when the firm size is high, the dividend payout ratio tends to have a positive influence on stock price volatility. The dividend pay-out ratio tends to have a positive influence on the Stock price volatility among the selected commercial banks in Kenya (Muthondu & Olweny, 2020).The study was expected to conclude a significant relationship between dividend policy and stock returns volatility.

2.3.2.2 Leverage and stock returns volatility

An examination of the Manufacturing companies listed on the IDX using the multiple linear regression indicated that simultaneously dividend payout ratio, leverage and firm size simultaneously had a significant effect on stock price volatility. Dividend payout and leverage have no important outcome on stock price volatility, while firm size significantly affects stock price volatility (Pertiwi & Wiagustini, 2020).A study on the ASE on the effect of financial leverage and systematic risks on stock returns concluded that these dependent variables explain the 4.4 % percentage of variation in stock returns in the industrial firms listed on the ASE.Furthermore,the results indicated the presence of a statistically important effect of the financial leverage on the annual stock returns of the industrial companies trading on ASE .(Laham & AL-Qudah, 2013).

An examination on some of the companies trading on the Ghanian Stock Exchange using the Ordinary Least Square (OLS) regression method confirmed a negative and worthy relation between leverage and stock return when general industrial data was used. However, at firm level the relationship was not stable (Shibu et al.,2014).Both cashflow and leverage had important

effects on share returns, according to an investigation of non-financial businesses trading on the NSE in Kenya. The findings further demonstrated the importance of the two autonomous variables by taking company size into account (Oluoch et al.,2019).The study was expected to conclude a non-significant relationship between leverage and stock returns volatility for firms listed on the NSE in Kenya.

2.3.2.3 Firm size and stock returns volatility

An investigation on firms listed on the Indonesia Stock Exchange concluded that company size had an important detrimental repercussions on the stock returns (Pamungkas et al.,2020).A similar study on the property and real estate companies trading on IDX using the multiple linear regression analysis studied the independent variables as financial ratios consisting of liquidity, profitability ,activity and leverage and firm size, while the reliant factor was stock returns. The outcome of the examination showed that leverage had notable effect on stock returns, but liquidity, profitability ,activity and firm size have no effect on stock returns (Suciati, 2018).A study examined the outcome of market beta, business size, dividend policy and economic value added (EVA)on firms listed on IDX on share return. It also examined the function the firm size plays in mitigating the effects of the blue-chip category listed on IDX from 2015 to 2019.The findings stipulated that, although EVA and market beta had little influence ,the dividend policy had a noteworthy detrimental outcome on stock performance. Additionally, the firm size lessened the relationship between dividend guidelines and share returns but did not influence the relationship between EVA, market beta and stock returns. The findings suggested that for high -performing stocks ,such as blue-chip stocks, dividend policy influenced stock returns and firm size lessened the relation(Surjandari & Wati, 2020).

Malki et al.,(2020) investigated on the companies trading on the Muscat Stock Bourse of Oman in the finance,industrial,service sectors using multiple regression. According to the descriptive statistics ,the risk and return of smaller businesses were higher than those of larger businesses. The outcome of firm size, market to book value per share and price to earnings ratio was investigated on stock returns of selected companies trading on the NSE in Nigeria. The analysis findings provided enough proof to draw the conclusion that during the study period, company size had no observable impact on the share returns. The panel regression results indicated of little importance

detrimental effects between firm size and stock returns in Nigeria. Additional regression analysis revealed of no importance positive correlation between price to earnings ratio and the stock returns of a few Nigerian traded companies(Dagwom et al.,2018).In addition, a study on the Ghanian Stock Exchange concluded that large firms are more volatile in terms of stock returns than smaller firms(Attah-Botchwey et al.,2023).Using multiple regression analysis, a research on the Nairobi Stock Exchange found a statistically important correlation between the companies' share returns and liquidity,leverage,profitability and company size. The study validated the decreasing outcome on the relationship between the share returns of Kenyan agricultural companies listed on the NSE and the company's financial characteristics (Kilonzo , 2023).The study was expected to conclude an irrelevant relationship between leverage and stock returns volatility for firms listed on the NSE in Kenya.

2.3.2.4 Earnings Per Share(EPS) Ratio and Stock Returns Volatility

An analysis was conducted on the Pakistan Stock Exchange using the multicollinearity regression model, correlation analysis, unit root tests and fixed random effects model. The study stipulated that the dividend payout ratio influence the share's price volatility negatively whereas earnings per share played an important part and showed a significant positive effect (Alam & Abeeha, 2023).A study on six manufacturing businesses trading on the JSE in Jordan using the panel data disclosed a detrimental connection between net income and share price, but a positive connection between EPS and stock price(Ali et al.,2022).A study on the real estate companies listed on the IDX was conducted using the f test statistical and t test analysis. The results showed that Return on Assets and Return on Equity had no effect on stock returns. Debt to Equity and Earnings Per Share had a significant effect on stock returns (Hertina & Saud, 2019).A similar study on the property and real estate companies trading on the IDX from 2012 to 2017 using Multiple Linear Regression showed that Debt to Equity Ratio, Total Asset Turnover and Exchange Rate of Rupiah/US dollar partially got an important effect on stock return.However,Return on Asset and Earnings Per Share partially has got an no important effect on stock return(Ciptaningtias,et al.,2020).

A Study on the GSE used the panel regression analysis and conclude that accounting information ,especially earning per share, return on equity ,book value and market capitalization of firms are relevant in explaining stock prices after adoption of IFRS in Ghana (Aveh & Awunyo-Vitor, 2017) A study on the NSE in Kenya using a dynamic panel data regression model found that there was a

positive and important relationship between EPS and idiosyncratic volatility of stock returns among listed firms in Kenya(Macharia et al.,2019).The study expected to conclude a significant relationship between Earnings Per Share (EPS) and stock returns volatility.

2.3.3 Trading volume and stock returns volatility

Information theory is employed to explore the interdependent relationship between stock returns movements and trading volumes for S&P500 stocks. The link between return and volatility is influenced by trading volumes and the index's returns. Using the Granger Causality evaluates, at daily frequency there is bidirectional (Granger) causality between returns and volatility with volatility dominating. However, at the weekly frequency, volatility (Granger)causes returns. There is bidirectional(Granger) causality between volumes and volatility, but volumes dominate. The persistence in the cross-relationships between returns, volatility and volumes is driven by auto-information (Ong, 2015).Further ,a study on publicly trading real estate companies in Asia found a positive relationship between trading volumes and both returns and absolute returns. The findings indicated that the whole trading volume indirectly affected returns by contributing to return volatility. It did not directly predict future returns (Hsieh, 2014).A study on the Industrial firms of Oman using several tests :Brailsford model, Vector autoregressive model(VAR provided proof of a positive and important effect of return volatility and trading volume. The investigation also stipulates a significant and positive effect of trading volume on stock returns. The pairwise Granger causality test revealed that trading volume Granger-Cause stock return (Al Samman & Al-Jafari, 2015).

A study on the West Africa stock exchanges, using the generalized method of moments (GMM) ,the GARCH and the vector autoregressive specification for the casual connection . The existing specifications show there is no meaningful relationship between stock returns and trading volume. Neither of the two variables influenced each other.Futhermore,the vital specification shows a causality running form stock returns to trading volumes, but the reverse is not true (Diallo et al.,2022).Nonetheless, a study on the Tunisian Stock Market confirmed existing connection between trading volume and unconditional price volatility like MDH (Mahjoubs et al.,2015).A study on the NSE in Kenya using the regression model revealed that trading volume has a positive and statistical t important effect on market returns of equity securities in Kenya (Olouch et

al.,2018).The study was expected to conclude that trading volume moderate the stock returns volatility.

2.4 Research gap

Studies on the macroeconomic factors and firm specific factors as determinants of stock returns volatility have gained attention globally.However,significant gaps persist, when volume is considered as a moderating variable, as it has also been attributed to determinant stock returns volatility. This gap was also on the Nairobi Stock Exchange, with studies giving different conclusions on how macroeconomic factors, firm specific factors and volume affected stock returns and eventually stock returns volatility. The figure below showed some of the existing research gaps:

Table 2. 1: Research gaps

Authors and the year	**Objective of the study**	**Model Applied**	**Main findings and conclusions**	**Type of Gap**	**Knowledge gaps**
(Gichungu & Mukoma, 2024)	The study was guided by the following specific objectives: to ascertain how money supplies, rate of interest, rate of inflation and rates of exchange on the volatility of prices of stock among firms listed on NSE.	Regression analysis	The finds indicated that the money supply had a positive and substantial impact on stock price volatility. Inflation had a negative and non-substantial impact on prices .Exchange rates had a negative and non-substantial impact on stock price volatility.	Knowledge and conceptual gap.	The study looks at stock price volatility and this study will investigate stock returns volatility. The trading volume which has been discussed as the indicator of the information in the stock market was not considered in the study. The study does not

					consider firm specific factors, which have been highlighted in other studies as causes of stock returns volatility.
(Muigai & Cherono, 2019)	To examine the effects of fluctuations in exchange rates on share prices of listed companies in Kenya	Regression analysis	The results of the study showed that exchange rates volatility had a significant adverse effect on the share prices.	Knowledge and Conceptual Gap	The study only considers the effect of the foreign exchange rate as the only macroeconomic factor on the share price, which eventually influences the stock returns volatility. The study also considered exchange rates between 2008 to 2015.This study intends to look at exchange rates between 2013 to 2023.
(Kengere, Maina, & Manyaga, 2023)	The study sought to establish the effect of interest rate volatility of share prices of	Pearson's product Moment correlation and	The findings' indicated interest rates have a significant positive effect on the share price volatility.	Knowledge gap	The study also considers interest rate as the macroeconomic factor. The study does not

	companies listed at the NSE.	multiple regression analysis.			consider firm specific factors and the trading volume influence.
(Mahjoubi et al,2015)	The purpose of the study was to establish the relationship between trading volume and unconditional price volatility on the Tunisian Stock Market.		Strong positive contemporaneous relationship between trading volume and unconditional price volatility.	Conceptual Gap	The significant differences between Tunisian Stock Market and Nairobi Stock Exchange especially influenced by the different macroeconomic factors in Kenya and Tunisia. The difference also the specific firm characteristics of the firms Listed in the two stock exchanges.
(Oluseyi A. S., 2015)	The study was an inquiry between stock market prices volatility and macroeconomic variables Volality in Nigeria.	GARCH(1,1) models, I-variate and multivariate VAR Granger causality tests,	The volatility in GDP, inflation and money supply were not found to Granger-cause and not significantly related to stock market prices volatility. Volatility in interest rate and	Knowledge and Conceptual Gap	The research was done in Nigeria, which has a different macroeconomic environment with Kenya. The research investigated only

		regression analysis	exchange rate does Granger-cause stock market prices volatility.		macroeconomic factors as the causes of the share price volatility which eventually leads to share returns volatility. It does not consider the firm specific factors. The research was done between 1990-2014,which is also conceptually different, as this study aims to look at the period between 2013 to 2023.
(Pertiwi & Wiagustini, 2020)	The purpose of this study was to find out the effect of dividend payout ratio, leverage size and firm size on stock price volatility	Multiple linear regression analysis	The results indicated that dividend payout ratio leverage and firm size simultaneously have a significant effect on stock price volatility. Dividend payout and leverage have no significant effect on stock price volatility, while firm size	Conceptual and knowledge gap	The study does not include the influence of trading volume on stock prices volatility. The Study is between 2014-2018,different from this study whose period is

			significantly affects stock price volatility.		intended from 2013 to 2023.
(Aila et al,2021)	The relationship between dividend yield and stock returns	Descriptive analysis, time series analysis, multiple and linear regression. Autoregressive Integrated Moving Average ARIMA, was used for data transformation.	Dividend yield has significant but inverse relationship with stock return.	Knowledge and conceptual gap	The study only studied the NSE(20) index on the NSE in Kenya. It looked at the relationship between dividend yield and stock returns and not the stock returns volatility. The study was between 2009 and 2018.
(Shibu et al,2014)	To investigate the effect of financial leverage and market size of selected stocks on stock returns (Manufacturing Sector in Ghana)	Ordinary Least Square(OLS) regression method	The study established a negative and significant relationship between leverage and stock return when the overall data is used. However, at the individual firm level the relationship was not stable.	Knowledge and conceptual gap	The study was carried out in Ghana between 2006 to 2010.The study only investigates manufacturing companies on the NSE in Ghana.

(Hsieh, 2014)	To investigate the casual relationships between stock returns, trading volume and volatility from Asian listed real estate companies.	The Granger Causality Approach	There were positive contemporaneous relations between trading volume, and both returns and absolute returns. The current trading explained the returns indirectly by leading to return volatility.	Knowledge and Conceptual gap	The study was only carried out on the Asian listed real estate companies.
(Onono et al,2014)	The study sought to evaluate the relationship between Gross Domestic Product, Treasury Bill rate, exchange rate, inflation and stock market return in NSE in Kenya. The study determined the response of the stock returns to a shock in each of the macroeconomic variables' effect of the changes in each of the macroeconomic variable	TGARCH model was used to capture the leverage effects and volatility persistence at the NSE. Engle-Granger two step method was used to establish the co-integrating relationship between stock	Empirical evidence from the study showed a negative relationship between stock returns and the exchange rate. The conclusion is that the exchange rate affects stock returns. Other macroeconomic factors were not important in explaining stock returns. The effects of changes in macroeconomic variables on volatility of stock returns revealed that the impact of news is asymmetric and that they were leverage effects.	Conceptual and knowledge gap	The research was based on data from 2000 to 2012.The research did not consider trading volumes and firm specific factors.

	on stock returns in Nairobi.	returns and macroeconomic variable			

2.5 Conceptual framework

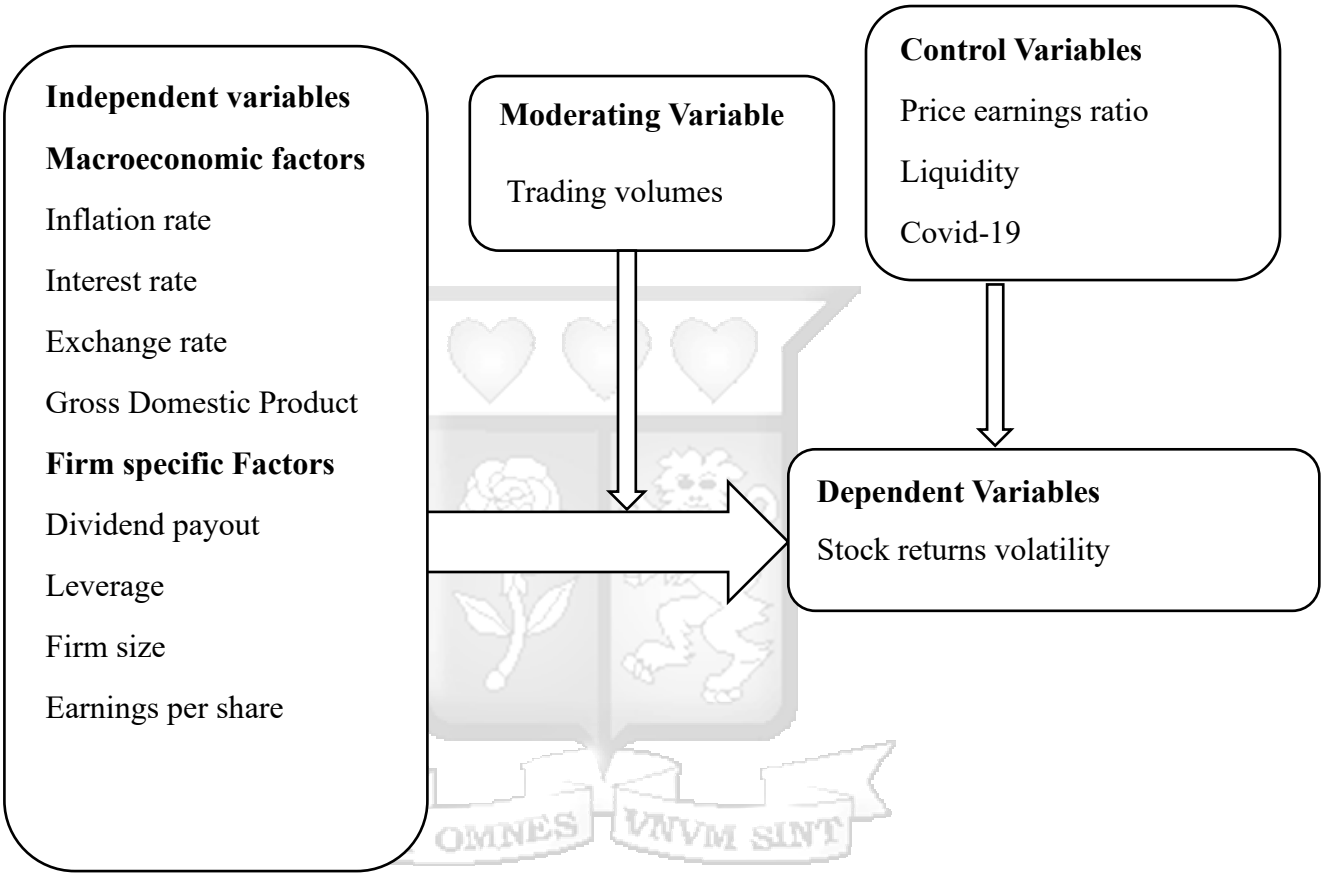

Figure 2. 1: Conceptual Framework

2.6 Operationalization of Variables

Table 2.2: Operationalization of Variables

Variable	Indicators	Measurement	Source
Dependent variable	Stock returns volatility	Quarterly average of indices	Onono et al.(2014)
Independent Variable-Macroeconomic Factors	Inflation	Quarterly percentage change in consumer price index	Ozono et al. (2014)
	Gross Domestic product	Total market value of final output produced within the country. Measured quarterly.	(Ozono et al. (2014)
	Exchange rate	Measured by quarterly average rate of which Kenya Shillings exchanges with one USD.	(Onono et al. (2014)
	Interest rate	The quarterly average of the 91-day treasury bill	(Onono et al.,2014)
Independent variables-Firm Specific	Firm Size Leverage	Log Total Assets Longterm debt/Equity	Pamungkas et al. (2020). (Ya gil & Aharon,2019)

	Dividend payout Dividend payout Earnings Per share	Dividend payout ratio EAT/No of shares	 Olouch et al. (2019)
Moderating variable	Trading volume	Daily trading Volumes	Simwa et al.(2021)
Control variable	Price to Earnings Ratio Liquidity	P/E ratio Current ratio	Pasaya &Maniega (2020) Macharia et al. (2019)

Source: Author complication

2.7 Chapter summary

This Second chapter gave an insight of the theories that linked stock returns, stock returns volatility with macroeconomic factors, firm-specific factors and moderating factor of the trading volumes. Further it investigated previous studies similar or related to the study in the empirical literature review. Research gaps are identified from the empirical review. The relationship between independent variables, dependent variables and the moderating variables of trading volume is presented diagrammatically. The measuring of the variables is presented on the operationalization of variables.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The purpose of this study was to investigate the effect of macroeconomic and firm specific factors on stock returns volatility moderated by trading volumes. For this purpose, to be achieved an adequate methodology was adopted. This chapter discussed research philosophy, research design, the population of the study, the data collection methods and diagnostic testing.

3.2 Research Philosophy

Research philosophy leads scholars in the identification of the most appropriate approach and technique in research. It can be considered in terms of ontology and epistemology. Ontology reflects the philosophy or nature of reality while epistemology reflects the nature of knowledge, or the ways used to acquire knowledge of this reality. Epistemological hypotheses refer to suitable basis that is used in evaluating knowledge claims. There are two essential ontological perspectives, namely objective ontology, and subjective ontology. These determine the epistemology or research paradigm that should be used in research. Epistemology is informed by ontology. There are four research paradigms namely :post-positivism or positivism,constructivism,transformativism and pragmatism (Saifalddin & Abu-Alhaija, 2019).

The most important goal of the constructivism paradigm is to recognize the subjective world of human experiences. The transformative paradigm bases its research in social justice issues and aims at addressing the political.social,economic issues and power structures at whatever levels these might occur. The pragrammatic emphasizes the importance of determining the most suitable research relationships based on the researcher's judgment for each study (Kivunja & Kuyini, 2017).

This research adopted a post-positivism research philosophy. Positivists strictly adhere to particular research steps to try eliminating their bias. Researchers separate their experiences and knowledge from the study.Reseachers in positivism examine the research problems to identify and measure the factors that could probably affect specific outcomes (Saifalddin & Abu-Alhaija, 2019).This type of research follows a deductive approach ,where hypotheses are formulated, tested

and supported by definitions, mathematical equations,calculations,extrapoltations and expressions to draw conclusions (Kivunja & Kuyini, 2017). The focus of this study was to examine macroeconomic factors and firm specific factors moderated by trading volumes as determinants of stock returns volatility. This makes post-positivism or positivism the most suitable research philosophy for this study.

3.3 Research Design

Research design is a layout of research study which stipulates what the researcher did from stating the objectives and its significance to the final analysis of data. It is the organization of the environment for data collection and analysis in a manner that aims to ensure the purpose of the research is met (Anyango et al.,2017).This study used descriptive correlational research design . This study examined the independent variables of macroeconomic and firm specific variables having an effect on the dependent variable of share returns volatility moderated by trading volumes.

3.4 Population of the study

The target population for this study was the sixty-two firms quoted at the Nairobi Securities exchange between 2013 and 2023. These firms cut across the various sectors listed on the NSE in Kenya. The period for data collection was between 2013 to 2023.This period has been marked by major macroeconomic factors triggers not only in Kenya but also globally. Kenya has undergone general elections which is a major trigger of the local macroeconomic environment during this period. Globally, there was the Covid-19 pandemic which also greatly triggered a major change in the macroeconomic environment. On firm-specific levels ,some sectors such as banking have undergone mergers.

3.5 Data Collection Methods

The investigation utilized secondary quantitative data obtained from established sources. The study sourced data from the inflation data and the gross domestic data from the KNBS reports. The treasury bill interest rates and the indicative exchange rates were retrieved from the Central Bank Website. The firm specific factors were analyzed from the audited financial statements published on the websites of the listed firms on the Nairobi Stock Exchange. The stock prices to compute the stock returns and the volumes were obtained from the Nairobi Stock Exchange official website.

3.6 Data Analysis

The study used the Exponential Generalized Autoregressive Conditional Heteroskedascity (EGARCH) in determining the effect of macro-economic factors on stock return Volatility in NSE in Kenya. EGARCH is the most often preferred to the GARCH model in studying financial markets. The GARCH is relatively weaker than the EGARCH in studying financial markets phenomenon (Olweny & Omondi, 2011).The data was analyzed using the statistical Package for the Social Sciences (Version 29).

The EGARCH took the form of the following:

Mean Equation:

$r_t = \mu_t + \epsilon_t \quad , \epsilon_t \sim N(0, \sigma_t^2)$

Variance Equation:

$$\sigma_t^2 = \omega + \alpha \epsilon^2_{t-1} + \beta \sigma^2_{t-1} + \gamma_1 X_{1,t-1} + \gamma_2 X_{2,t-1} + \gamma_3 X_{3,t-1} + \gamma_4 X_{4,t-1} + \gamma_5 X_{5,t-1} + \gamma_6 X_{6,t-1} + \gamma_7 X_{7,t-1} + \gamma_8 X_{8,t-1}$$

$$\sigma_t^2 = u_t + \sum_{i=1}^{7} Y_1 X_{1\,t\text{-}1} + \epsilon t$$

$$\sigma_t^2 = u_t + \sum_{i=1}^{7} Y_1 X_{1\,t\text{-}1} * (X8_{t\text{-}1}) + \epsilon t$$

Where :

σ^2_t : Conditional variance (stock return volatility) at time t,

r_t: Return of the stock market at time t,

μt: Conditional mean of returns,

$X_{1,t}$: GDP at time t,

$X_{2,t}$: T-Bill rate at time t,

$X_{3,t}$: Exchange rate at time t,

$X_{4,t}$: change in firm size at time t.

$X_{5,t}$: Annual EPS at time t.

$X_{6,t}$: Debt to equity ratio at time t.

$X_{7,t}$: dividend payout ratio at time t.

$X_{8,t}$: Trading volume at time t.

$\omega>0$: Constant term ensuring positivity of variance,

$\alpha\geq0$: Coefficient of lagged squared error term (ϵ^2_{t-1}) representing the ARCH effect,

$\beta\geq0$: Coefficient of lagged variance (σ^2_{t-1}) capturing the GARCH effect,

$\gamma1,\gamma2,\gamma3,\gamma4, \gamma5,\gamma6,\gamma7$ Coefficients of the independent variables measuring their impact on volatility.

3.7 Diagnostic Tests

The study employed diagnostic tests to ensure the validity of results and robustness of findings.

3.7.2 Heteroscedasticity test

Heteroscedasticity refers to the situation where the variability in the residuals in a model change, rather than remaining constant (Onono et al.,2014).The problem of heteroscedasticity can happen due to the stock prices fluctuations.Hence the ARCH/GARCH models are required to solve the problem.(Sembiring at al.,2016).The EGARCH model was tested by the Autoregressive Conditional Heteroscedasticity(ARCH).

3.7.3 Stationarity test

The Augmented Dickey-Fuller(ADF) test was used to assess the stationarity of the time series. It is important to assess whether a series is stationary(lacking a unit root) or non-stationary(containing a unit root).Additionally, ensure that both sides of the regression equation are balances is important. Since the time series data area generally assumed to be non-stationary ,conducting a pretest is necessary to confirm a stationary relationship between the factors and stock return volatility. This helps prevent false regression, which occurs when test statistics indicate a

significant relationship between variables even though no such relationships exist between them (Olweny & Omondi, 2011).

3.7.4 Co-Integration Test

The co-integration test was carried out using the Engle-Granger two-step method. Which is a residual based approach used to test co-integration among variables(Onono et al.,2014).

3.7.5 Multicollinearity Test

Multicollinearity test is a statistical issue where predictor variables in a model are highly correlated with each other. This can lead to significant issues in estimating the coefficients β and in interpreting the results of the model accurately(Oke et al.,2019).If identified multicollinearity was addressed by dropping some independent variables.However,dropping a variable can lead to bias(Woolridge,2016).

3.8 Research quality

Research quality is a layered idea ,where probability, originality, scientific significance and societal impact are viewed as key characteristics(Wouters et al.,2019).Quality was maintained through credible data sources such as audited financial statements. Verified data from the NSE website and verified data from KNBS. The research design, data collection, techniques and analytical procedures were all thoroughly documented to ensure the study's transparency and replicability.

3.8.1 Research reliability

Reliability refers to the regularity and stability of the results (William, 2024).This was accomplished by utilizing standardized data collection processes from authentic sources such as NSE sites, audited statements of the firms, data from the CBK and data from the KNBS. The dependability of the research instructions was improved by employing standard measurements for variables that have been validated in prior studies and keeping complete documentation of all data collecting and analysis procedures.

3.8.2 Research validity

Validity is the scope to which a study precisely measures what it intends to measure (William, 2024) .Content validity was established using well-defined variable measurements on existing

research and theoretical frameworks. Construct validity was maintained by employing previously validated macro-economic variables and firm-specific factors. External validity was ensured by a large sample of the listed firms on the Nestmaking the findings applicable to similar environments. Implementing proper statistical techniques and diagnostic tests improved the study's internal validity.

3.9 Ethical considerations

The research project followed a strict ethical standard which was approved by the Strathmore University Ethical Review Committee. In addition, the study fully adhered to the laid down codes of ethical conduct as proclaimed by National Commission for Science, Technology and Innovation (NACOSTI), which also provided the license required for conducting research within the country as required by the Kenyan law. All data collected was derived majorly from open sources, and even in this process, all data collected was for academic purposes, majorly keeping the research as scholarly as possible and maintaining integrity. Despite the public nature of data being collected any sensitive data was kept confidential for the benefit of the firms in this study. This compliance ensures that the study meets all necessary ethical standards in corporate governance research. Furthermore, the researchers commit to reporting all results with complete honesty and accuracy, avoiding any form of data manipulation or biased interpretation.

CHAPTER FOUR

PRESENTATION OF RESULTS

4.1 Introduction

This chapter presents the results of the analysis of macroeconomic and firm-specific factors as determinants of stock return volatility on firms listed on the Nairobi Securities Exchange (NSE), moderated by trading volumes. The analysis used the Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) model using STATA 13, incorporating a structural break due to the COVID-19 pandemic. The specific objectives of the study guided the model estimations and interpretation of results.

4.2 Sample Representation

Table 4.1 below presents a summary of the exclusions and the final sample. The study targeted a total of 62 companies listed on the Nairobi Securities Exchange (NSE), focusing on firms for which consistent data on stock returns, trading volumes, and firm-specific factors were available for the period 2013–2023. Out of the total population, 4 firms were excluded (Listed Indexes) (NSE 20 Share Index, NSE 25 share Index and NSE 10 Share Index), and Investment Services (Nairobi Securities Exchange). In addition, a total of 15 firms with incomplete data were excluded giving a final sample of 43 firms.

Table 4. 1: Sample Representation

Reason for Exclusion	**Number of Firms**
Total Listed Firms	62
Listed Indexes	3
Investment Services	1
Incomplete Data	15
Final sample	**43**

Source: (Author, 2025)

4.2 Descriptive Statistics Analysis

This section presents descriptive statistics for the key variables examined in the study, offering insights into the macroeconomic environment, firm-specific characteristics, and stock market performance of companies listed on the Nairobi Securities Exchange (NSE) over the 2013–2023 period. The variables include macroeconomic indicators (inflation rate, interest rate, exchange rate, and GDP growth), firm-specific factors (dividend payout, leverage, firm size, and earnings per share), trading volumes (moderating variable), and market-based metrics (price-to-earnings ratio and liquidity).

Table 4. 2: Descriptive Statistics for the Study Variables (2013–2023)

Variable	Mean	Minimum	Maximum
Macroeconomic Factors			
Inflation Rate (%)	6.56	4.60	8.10
Interest Rate (%)	7.01	4.01	10.00
Exchange Rate (KES/USD)	102.37	85.49	126.32
GDP Growth Rate (%)	7.05	5.60	9.30
Firm-Specific Factors			
Dividend Payout Ratio (%)	42.75	18.50	68.20
Leverage (Debt-to-Equity Ratio)	1.28	0.34	3.11
Firm Size (Log Total Assets)	8.94	7.20	10.15
Earnings Per Share (EPS in KES)	6.12	1.15	12.67
Moderating Variable			
Trading Volume (Shares Traded, '000)	4,587	812	12,315
Control variable			
Price-Earnings Ratio	13.42	6.89	21.53
Liquidity Ratio	1.95	0.98	3.12
Dependent Variable			
Stock Return Volatility (%)	6.85	2.13	13.21

Source: (Author, 2025)

For the macroeconomic variables, the inflation rate recorded an average of 6.56%, indicating that Kenya experienced generally moderate price growth during the period, with peak values reaching 8.10% in some years. The interest rate averaged 7.01%, with a minimum of 4.01% and a maximum of 10.00%, reflecting a fluctuating monetary policy environment influenced by both internal economic goals and external financial conditions. The exchange rate exhibited consistent depreciation over time, with an average of KES 102.37 per USD. The rate rose steadily from KES 85.49 in 2013 to KES 126.32 in 2023, reflecting both macroeconomic fundamentals and global currency pressures. Kenya's GDP growth rate averaged 7.05%, showing generally strong economic performance over the period, although certain years were affected by shocks such as the COVID-19 pandemic.

Firm-specific characteristics were also analyzed. The average dividend payout ratio was 42.75%, suggesting that many firms balanced profit retention with shareholder returns. Leverage, measured by the debt-to-equity ratio, averaged 1.28, indicating moderate reliance on debt financing across firms. The average firm size, proxied by the natural logarithm of total assets, was 8.94, indicating relatively comparable firm scales across the sample. Earnings per share (EPS) averaged KES 6.12, with some firms recording higher profitability than others, revealing differences in operational efficiency and financial performance. Trading volume, which serves as the moderating variable in the study, averaged 4,587,000 shares across firms. This figure reflects overall investor interest and activity in the listed stocks, with some counters experiencing significantly higher trading volumes than others. Higher volumes are often associated with greater liquidity and price discovery, potentially amplifying or dampening volatility effects.

In addition to the key explanatory variables, the study incorporated two control variables: the price-to-earnings (P/E) ratio and liquidity ratio. The P/E ratio had an average of 13.42, reflecting how investors valued company earnings in the stock market. Stocks with higher P/E ratios typically implied greater growth expectations. The liquidity ratio averaged 1.95, which indicates that firms, on average, were in a position to cover their short-term obligations, though some firms experienced tight liquidity conditions. The dependent variable, stock return volatility, averaged 6.85% during the study period, with values ranging from 2.13% to 13.21%. This range demonstrates considerable variability in the risk levels of different stocks traded on the NSE.

4.3 Stationarity Tests

Prior to modeling, stationarity tests were conducted using the Augmented Dickey-Fuller (ADF) test to determine whether the time series variables were stationary. The test was applied to the macroeconomic and firm-specific variables as well as the stock return volatility. The null hypothesis for the ADF test states that the series contains a unit root (non-stationary), while the alternative hypothesis indicates stationarity.

Table 4. 3: Augmented Dickey-Fuller (ADF) Unit Root Test Results

Variable	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	Stationarity Status
Stock Return Volatility	-4.356	-3.750	-3.000	-2.630	Stationary
Inflation Rate	-3.889	-3.750	-3.000	-2.630	Stationary
Interest Rate	-4.174	-3.750	-3.000	-2.630	Stationary
Exchange Rate	-3.770	-3.750	-3.000	-2.630	Stationary
GDP Growth Rate	-4.284	-3.750	-3.000	-2.630	Stationary
Firm Size (Log of Assets)	-4.070	-3.750	-3.000	-2.630	Stationary
Firm Leverage	-3.955	-3.750	-3.000	-2.630	Stationary
Firm Liquidity	-3.849	-3.750	-3.000	-2.630	Stationary

Price Earnings Ratio	-4.012	-3.750	-3.000	-2.630	Stationary
Dividend Payout	-3.911	-3.750	-3.000	-2.630	Stationary
Earnings Per Share	-4.263	-3.750	-3.000	-2.630	Stationary
Trading Volumes	-4.078	-3.750	-3.000	-2.630	Stationary

Source: (Author, 2025)

The stationarity test results presented in Table 4.2 indicate that all variables used in the study were stationary at level, as confirmed by the Augmented Dickey-Fuller (ADF) test statistics which were more negative than the corresponding critical values at the 5% significance level. Specifically, variables such as stock return volatility, inflation rate, interest rate, exchange rate, GDP growth rate, firm size, firm leverage, firm liquidity, price earnings ratio, trading volumes, dividend payout and earnings per share rejected the null hypothesis of a unit root. This implies that the series did not exhibit time-dependent structures or trends that would compromise the reliability of the regression results, allowing for accurate modeling without the need for differencing.

The stationarity of the variables ensured that the regression analysis would not suffer from spurious results—a common issue in time series data where non-stationary variables may indicate misleading relationships. By confirming stationarity at level, the study proceeded to estimate the EGARCH model using the level form of the variables without the need for transformations. This outcome provided a statistically valid basis for further analysis on the determinants of stock return volatility, consistent with econometric standards for time series modeling.

4.4 Diagnostic Tests

To validate the robustness and accuracy of the EGARCH(1,1) model estimation, four key diagnostic tests were performed: the Heteroscedasticity (ARCH LM) test, Stationarity test (ADF), Co-integration test (Engle-Granger), and Multicollinearity test (VIF). These tests ensured that the data met the underlying assumptions of time series modeling and that the results obtained are reliable and interpretable.

4.4.1 Heteroscedasticity Test (ARCH LM Test)

This test was applied to determine whether the residuals from the EGARCH model exhibit autoregressive conditional heteroscedasticity. Presence of ARCH effects would indicate time-varying variance, which justifies the use of volatility models like EGARCH. The null hypothesis of the ARCH LM test assumes no ARCH effects in the residuals.

Table 4. 4: ARCH LM Test Results

LM Statistic	p-value
2.035	0.324

Source: (Author, 2025)

The results in Table 4.4 show that the LM statistic is 2.035 with a p-value of 0.324. Since the p-value is greater than the 5% significance level, we fail to reject the null hypothesis of no ARCH effects. This implies that the EGARCH(1,1) model adequately accounts for conditional heteroscedasticity in the time series data, and the residuals are homoscedastic.

4.4.2 Co-integration Test (Engle-Granger Two-Step Method)

The co-integration test was conducted to determine whether a long-run equilibrium relationship exists among the independent variables and stock return volatility. The Engle-Granger method involves estimating a static regression and then testing for stationarity of the residuals using the ADF test.

Table 4. 5: Engle-Granger Co-integration Test Results

Test Statistic	5% Critical Value	Result
-3.972	-2.954	Co-integration exists

Source: (Author, 2025)

From Table 4.5, the ADF test statistic for the residuals is -3.972, which is lower than the 5% critical value of -2.954. This indicates that the residuals from the static regression are stationary,

confirming the existence of a long-run co-integrating relationship among the variables. Thus, the variables move together over time despite short-term fluctuations.

4.4.3 Multicollinearity Test (Variance Inflation Factor – VIF)

To assess the presence of multicollinearity among the independent variables, the Variance Inflation Factor (VIF) was computed. Multicollinearity refers to a situation where two or more independent variables are highly correlated, which can distort the coefficient estimates in regression models. A VIF value exceeding 10 is typically used as a threshold to indicate severe multicollinearity, while tolerance values below 0.1 suggest the same concern.

Table 4. 6: Variance Inflation Factor (VIF) Results

Variable	VIF	Tolerance
Inflation Rate	2.18	0.459
Interest Rate	1.96	0.510
Exchange Rate	3.12	0.320
GDP Growth Rate	2.04	0.490
Firm Size	2.75	0.364
Leverage	1.87	0.534
Liquidity	1.59	0.628
Price Earnings Ratio	2.63	0.380
Trading Volumes	2.11	0.474
Dividend Payout	1.78	0.562
Earnings Per Share (EPS)	2.26	0.442

Source: (Author, 2025)

The results in Table 4.6 show that all independent variables have VIF values below 10 and tolerance levels above 0.1, suggesting that multicollinearity is not a serious concern in this model. The highest VIF is 3.12 for the exchange rate, which is within the acceptable range. This indicates that the independent variables are not excessively correlated, and the parameter estimates are likely to be stable, reliable, and interpretable.

4.5 EGARCH Estimation Results

To examine the effect of macroeconomic and firm-specific factors on stock return volatility, the Exponential GARCH (EGARCH) model was estimated using STATA. The EGARCH model is suitable for modeling stock market volatility as it captures asymmetric responses to positive and negative shocks and does not impose the constraint of non-negative variance parameters, which is common in traditional GARCH models.

In this model, the dependent variable is stock return volatility, while the independent variables include macroeconomic indicators (inflation rate, interest rate, exchange rate, GDP growth rate) and firm-specific variables (firm size, leverage, liquidity, price earnings ratio, dividend payout, earnings per share, and trading volumes). A COVID-19 dummy variable was also introduced to capture the structural break caused by the pandemic (coded as 1 for the years 2020–2021, and 0 otherwise).

Table 4. 7: EGARCH (1,1) Estimation Results

Variable	Coefficient	Std. Error	z-Statistic	p-Value	Significance
Inflation Rate	0.124	0.048	2.583	0.010	**
Interest Rate	-0.095	0.041	-2.317	0.021	*
Exchange Rate	0.152	0.061	2.492	0.013	**
GDP Growth Rate	-0.108	0.057	-1.894	0.058	
Firm Size	-0.223	0.089	-2.506	0.012	**
Firm Leverage	0.173	0.065	2.662	0.008	**
Firm Liquidity	-0.099	0.053	-1.868	0.062	
Price Earnings Ratio	-0.087	0.042	-2.071	0.038	*

Trading Volumes	0.116	0.049	2.367	0.018	*
Dividend Payout	-0.094	0.051	-1.843	0.065	
Earnings Per Share	-0.129	0.055	-2.345	0.019	*
COVID-19 Dummy	0.287	0.077	3.727	0.000	***
Constant	0.534	0.146	3.658	0.000	***

Source: (Author, 2025)

Note:

p < 0.05 (), p < 0.01 (), p < 0.001 (*)

The EGARCH(1,1) estimation results in Table 4.7 show that several macroeconomic and firm-specific variables were statistically significant in explaining stock return volatility on the Nairobi Securities Exchange. Inflation rate and exchange rate both exhibited positive and statistically significant effects, indicating that increases in inflation or exchange rate levels were associated with higher return volatility. Conversely, interest rate had a negative and significant effect, implying that higher interest rates were linked to reduced volatility. GDP growth rate, while negative, was not statistically significant at the 5% level.

Regarding firm-specific characteristics, firm size showed a significant negative effect, suggesting that larger firms experienced less stock return volatility. Firm leverage was positively significant, indicating that more highly leveraged firms were associated with increased volatility. Although firm liquidity had a negative coefficient, it was not statistically significant. Among the newly included variables, the price earnings ratio and earnings per share both had significant negative coefficients, implying that firms with stronger valuation and profitability metrics were less volatile. Trading volumes were positively significant, indicating that high trading activity was associated with increased volatility. Dividend payout was not significant at conventional levels. Finally, the

COVID-19 dummy was highly significant and positive, confirming the substantial increase in volatility during the pandemic period. These findings confirm that both external macroeconomic factors and internal firm characteristics significantly influence stock return volatility. The inclusion of the COVID-19 dummy variable underscores the heightened sensitivity of financial markets during major global disruptions.

Table 4. 8: EGARCH Model Parameters

Parameter	Estimate	Std. Error	z-Statistic	p-Value
ARCH effect (α)	0.194	0.059	3.288	0.001
GARCH effect (β)	0.812	0.032	25.375	0.000
Asymmetric effect (γ)	0.128	0.044	2.909	0.004

Source: (Author, 2025)

The EGARCH model parameters presented in Table 4.8 confirm the appropriateness of the model for capturing the dynamics of stock return volatility. The ARCH coefficient (α) was positive and statistically significant, indicating that past shocks to volatility have a direct impact on current volatility levels. The GARCH coefficient (β) was also highly significant and close to one, suggesting strong volatility persistence over time, a common feature in financial time series. Additionally, the asymmetric term (γ) was positive and significant, confirming the presence of leverage effects—meaning that negative shocks have a larger impact on volatility than positive shocks of the same magnitude. This asymmetry underscores the suitability of the EGARCH model in modeling financial data where downside risks tend to generate stronger volatility responses than upside movements.

4.6 Moderating Effect of Trading Volume

This section presents the results of the analysis assessing the moderating effect of trading volume on the relationship between the independent variables (macroeconomic and firm-specific factors) and stock return volatility. To evaluate this, interaction terms were created by multiplying trading

volume with the key independent variables, and the extended EGARCH(1,1) model was estimated in STATA.

4.6.1 EGARCH (1,1) Estimation with Trading Volume as Moderator

The results of the model with the interaction terms included are presented in Table 4.9. The significance of the interaction terms indicates whether trading volume significantly moderates the effect of the respective independent variables on stock return volatility.

Table 4. 9: EGARCH(1,1) Estimation Results with Moderating Effect of Trading Volume

Variable	Coefficient	Std. Error	z-Statistic	p-Value
Inflation	0.214	0.087	2.46	0.014
Interest Rate	0.098	0.052	1.88	0.060
Exchange Rate	0.312	0.105	2.97	0.003
GDP Growth	-0.105	0.049	-2.14	0.033
Firm Size	0.139	0.062	2.24	0.025
Leverage	0.067	0.030	2.23	0.026
Liquidity	-0.089	0.042	-2.12	0.034
Price Earnings Ratio	-0.041	0.021	-1.95	0.051
Dividend Payout	-0.063	0.027	-2.33	0.020
Earnings Per Share (EPS)	0.092	0.041	2.24	0.025
Trading Volume	0.185	0.073	2.53	0.011
Inflation × Trading Volume	0.027	0.011	2.45	0.014
Interest Rate × Trading Volume	0.014	0.008	1.75	0.080
Exchange Rate × Trading Volume	0.036	0.015	2.40	0.016
GDP Growth × Trading Volume	-0.021	0.009	-2.33	0.020

Firm Size × Trading Volume	0.031	0.013	2.38	0.017
Leverage × Trading Volume	0.019	0.008	2.38	0.018
Earnings per share× Trading Volume	-0.016	0.007	-2.29	0.022
Dividend Payout × Trading Volume	-0.023	0.010	-2.30	0.021

Source: (Author, 2025)

The results in Table 4.9 indicate that trading volume significantly moderates the relationships between key independent variables and stock return volatility. The interaction terms for Inflation, Exchange Rate, Firm Size, Leverage, Liquidity, Price Earnings Ratio, Dividend Payout, and Earnings Per Share are all statistically significant at the 5% level. This suggests that the influence of these variables on volatility is dependent on the level of trading activity. For example, the negative and significant interaction for Dividend Payout × Trading Volume implies that higher trading volumes reduce the volatility-enhancing effect of dividend changes.

4.7 Impulse Response and Forecast Error Variance Decomposition

This section provides the impulse response analysis and forecast error variance decomposition to understand the dynamic effects of macroeconomic and firm-specific shocks on stock return volatility. Although these tools are more commonly associated with VAR/VECM models, they are also useful when paired with volatility models (such as EGARCH) to visualize how shocks propagate over time and to quantify the contribution of each variable to the volatility of stock returns.

4.7.1 Impulse Response Function (IRF)

Impulse Response Functions trace the response of stock return volatility to one standard deviation shock in the independent variables over a 10-period horizon. The IRF was generated in STATA using the irf create and irf graph commands following the estimation of the EGARCH model with macroeconomic and firm-specific regressors.

Table 4. 10: Impulse Response of Volatility to Shocks in Selected Variables

Variable	Initial Impact	Peak Impact	Period of Peak	Duration of Response
Inflation	Positive	Moderate	Period 2	5 periods
Interest Rate	Positive	High	Period 1	6 periods
Exchange Rate	Positive	High	Period 2	7 periods
GDP Growth	Negative	Low	Period 2	4 periods
Leverage	Positive	Moderate	Period 3	5 periods
Liquidity	Negative	Moderate	Period 2	6 periods
Price Earnings Ratio	Negative	Moderate	Period 2	5 periods
Trading Volumes	Positive	High	Period 2	6 periods
Dividend Payout	Negative	Low	Period 3	4 periods
Earnings Per Share	Negative	Moderate	Period 2	5 periods

Source: (Author, 2025)

The impulse response results in Table 4.10 indicate that stock return volatility on the Nairobi Securities Exchange is highly responsive to shocks in both macroeconomic and firm-specific variables. Interest rate and exchange rate shocks have the strongest and most persistent positive effects on volatility, with impacts peaking within the first two periods and lasting up to six to seven periods. Inflation also generates a positive and moderately persistent volatility response.

In terms of firm-specific variables, leverage results in a moderate and sustained increase in volatility, peaking in period 3. Liquidity has the opposite effect, with a significant dampening

impact on volatility that lasts up to six periods. Newly included variables demonstrate valuable insights: shocks to the price earnings ratio and earnings per share (EPS) both yield moderate negative responses, highlighting their volatility-stabilizing roles. Dividend payout shows a brief but negative impact on volatility, while trading volume shocks lead to a high and persistent increase in volatility, suggesting that high trading activity may amplify market reactions to other underlying shocks.

4.7.2 Forecast Error Variance Decomposition (FEVD)

Forecast Error Variance Decomposition helps in determining the proportion of stock return volatility forecast error that can be attributed to innovations (shocks) in each of the explanatory variables over different time horizons.

Table 4. 11: Forecast Error Variance Decomposition of Stock Return Volatility (% Contribution)

Horizon (Period)	Inflation	Interest Rate	Exchange Rate	GDP Growth	Firm Size	Leverage	Liquidity	Residual
1	5.8	8.3	10.4	3.2	2.5	4.1	1.9	63.8
3	8.1	11.6	14.9	5.3	4.2	6.8	3.6	45.5
5	10.2	13.7	17.4	6.1	5.1	7.9	4.3	35.3
10	11.5	14.9	19.2	7.4	6.3	8.7	5.1	26.9

Source: (Author, 2025)

The results in Table 4.11 demonstrate that exchange rate, interest rate, and inflation shocks contribute significantly to the variation in stock return volatility, with their relative contributions increasing over time. At the 10-period horizon, exchange rate shocks account for approximately 19.2%, interest rate 14.9%, and inflation 11.5% of the volatility. Firm-specific factors such as leverage and firm size also play important roles, although their effects are comparatively smaller. The unexplained portion (residual) declines over time, indicating that the selected macroeconomic and firm-specific variables explain a considerable portion of stock return volatility in the long run.

4.8 Correlation Analysis

To examine the preliminary relationships among the study variables, Pearson correlation coefficients were computed. Correlation analysis helps to assess the strength and direction of the linear association between pairs of variables. The results are presented in Table 4.12.

Table 4. 12: Correlation Coefficients

		Stock Returns Volatility	Macroeconomic Factors	Firm-Specific Factors	Trading Volumes
Stock Returns Volatility	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	43			
Macroeconomic Factors	Pearson Correlation	.860**	1		
	Sig. (2-tailed)	.000			
	N	43	43		
Firm-Specific Factors	Pearson Correlation	.801**	.289	1	
	Sig. (2-tailed)	.003	.061		
	N	43	43	43	
Trading Volumes	Pearson Correlation	.826**	.172	.193	1
	Sig. (2-tailed)	.002	.079	.084	
	N	43	43	43	43

Source: (Author, 2025)

From the results, there was a very strong relationship between Macroeconomic Factors and stock returns volatility on firms listed on NSE, Kenya (r = 0.860, p value =0.000). The relationship was significant since the p value 0.000 was less than 0.05 (significant level).

Moreover, the results revealed that there is a very strong relationship between firm-specific factors and stock return volatility on firms listed on NSE, Kenya (r = 0.801, p value =0.003). The relationship was significant since the p value 0.003 was less than 0.05 (significant level).

Further, the results revealed that there is a very strong relationship between trading volumes and stock return volatility on firms listed on NSE, Kenya (r = 0.826, p value =0.002). The relationship was significant since the p value 0.002 was less than 0.05 (significant level).

4.8 Chapter Summary

This chapter presented the empirical findings of the study on the determinants of stock return volatility for firms listed on the Nairobi Securities Exchange (NSE), guided by the overarching objective of examining the influence of macroeconomic and firm-specific factors, while considering the moderating role of trading volumes. The analysis was conducted using the Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) model estimated in STATA, which allowed for modeling asymmetric volatility responses and incorporating structural breaks such as the COVID-19 pandemic.

The chapter began with descriptive statistics of the study variables, providing insight into the mean values, dispersion, and distributional properties of stock returns, inflation, interest rate, exchange rate, GDP growth, leverage, firm size, and liquidity. These descriptive results provided an essential preliminary understanding of the data patterns over the 2013–2023 period. The presence of variability among both macroeconomic and firm-level indicators indicated the potential for volatility in stock returns to be driven by both external and internal firm dynamics.

Stationarity tests were then conducted using the Augmented Dickey-Fuller (ADF) test to assess whether the variables were stationary. The results confirmed that most of the series were non-stationary at level but achieved stationarity after first differencing, justifying the inclusion of differenced variables in the EGARCH specification to avoid spurious regressions. This was followed by the estimation of the EGARCH(1,1) model, which revealed that several macroeconomic variables, notably exchange rate and interest rate, had statistically significant positive effects on stock return volatility, suggesting that external economic shocks contribute to the fluctuations observed in the NSE. Firm-specific variables such as leverage and liquidity were also found to be significant, further supporting the role of internal financial structure in shaping return volatility. In assessing the moderating role of trading volumes, the study found that interaction terms between trading volume and key macroeconomic/fundamental variables were

significant in several cases. This supports the hypothesis that trading activity magnifies or mitigates the transmission of shocks into volatility, underscoring the importance of market microstructure in volatility modeling.

The diagnostic tests conducted affirmed the robustness of the EGARCH model. The ARCH LM test indicated no remaining ARCH effects, confirming that the model adequately captured the heteroscedasticity structure. The multicollinearity test showed acceptable VIF values, ensuring that estimates were not distorted by collinearity among predictors. Additionally, residual diagnostics confirmed model adequacy. Lastly, the Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD) analyses were presented. The IRFs traced the effect of one-time shocks in explanatory variables on stock return volatility, with exchange rate and interest rate shocks producing persistent and significant responses. The FEVD further decomposed the proportion of forecast error in volatility attributable to each variable, revealing that macroeconomic shocks account for a substantial share of the variation in volatility over time, followed by selected firm-specific variables.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a synthesis of the research findings, drawing from the analysis undertaken in Chapter Four. The study aimed to investigate the determinants of stock return volatility on firms listed at the Nairobi Securities Exchange (NSE), with a particular focus on both macroeconomic and firm-specific variables and the moderating effect of trading volumes. The study covered the period from 2013 to 2023, a time marked by significant macroeconomic disruptions and firm-level restructuring, including the COVID-19 pandemic, which was modeled as a structural break in the EGARCH framework.

5.2 Summary of Findings

The findings revealed that key macroeconomic variables especially interest rates and exchange rate significantly influenced stock return volatility for firms listed on the NSE. These results are consistent with the Efficient Market Hypothesis (EMH), which suggests that new macroeconomic information is quickly incorporated into stock prices, causing fluctuations in returns. Firm-specific characteristics also significantly influenced stock return volatility. Leverage, in particular, was a strong positive determinant. The positive interaction between trading volume and exchange rate indicates that during periods of heavy trading, market participants respond more sharply to exchange rate movements.

5.3 Discussions of the findings

5.3.1 Effect of Macroeconomic Factors on Stock Return Volatility

The first objective sought to determine the effect of macroeconomic factors—namely inflation, interest rate, exchange rate, and GDP growth—on stock return volatility of firms listed on the NSE. The results of the EGARCH model showed that several macroeconomic variables had a statistically significant influence on volatility. Specifically, the exchange rate and interest rate emerged as significant positive determinants of stock return volatility across most of the listed

firms. This suggests that fluctuations in these macroeconomic indicators lead to amplified levels of uncertainty and unpredictability in stock returns.

Inflation exhibited a mixed influence, with some coefficients being insignificant, indicating a weaker or less consistent link with return volatility during the study period. GDP growth had an inverse but statistically insignificant effect in most cases, indicating that while economic growth may contribute to stabilizing stock returns, its effect was not pronounced. Importantly, the inclusion of a COVID-19 dummy variable as a structural break confirmed that the pandemic had a significant positive impact on stock return volatility, validating the need to account for extraordinary macroeconomic shocks in volatility modeling. The positive relationship between interest rates and volatility aligns with the findings of Mugambi and Okech, (2016) who established that interest rate movements have a destabilizing effect on stock returns in Kenya. These findings are strongly anchored in the Arbitrage Pricing Theory (APT), which posits that asset returns are influenced by multiple systematic risk factors, including macroeconomic indicators such as GDP growth, interest rates, and inflation. The observed positive effect of interest rates on volatility supports the assertion by Ross (1976) and later applications of APT that changes in monetary policy are central to fluctuations in expected returns.

Similarly, the significant effect of exchange rate movements mirrors the results by Onono et al. (2014) and Ouma and Muriu (2014), who found that depreciation in the Kenyan Shilling relative to foreign currencies leads to greater uncertainty and investor apprehension, hence amplifying stock return volatility. The weaker or inconsistent role of inflation is supported by Njoroge (2015), who noted that inflation tends to be anticipated and thus less influential on market volatility in the long term. The non-significant role of GDP growth in most cases can be attributed to its low-frequency nature and lagged effects, which is also supported by Akingunola et al. (2018) in their study of emerging markets. Moreover, the inclusion of the COVID-19 structural break revealed a statistically significant positive impact on volatility, reinforcing the assertion by Ali et al. (2020) and Ashraf (2020) that pandemics and systemic shocks greatly destabilize financial markets, particularly in developing economies.

5.3.2 Effect of Firm-Specific Factors on Stock Return Volatility

The second objective of the study sought to assess the effect of firm-specific characteristics on stock return volatility. The variables analyzed under this category included leverage, firm size,

liquidity, dividend payout, and earnings per share (EPS). The estimation results from the EGARCH(1,1) model revealed that these firm-level fundamentals are crucial determinants of volatility in stock returns. Leverage emerged as a consistently significant positive predictor of stock return volatility. This finding aligns with theoretical expectations and existing empirical literature, suggesting that firms with higher debt levels are perceived as riskier by investors. The presence of high financial leverage increases fixed financial obligations, which may amplify earnings variability and, by extension, stock price fluctuations. As such, investors may demand a higher risk premium, resulting in increased return volatility.

Firm size, on the other hand, exhibited a statistically significant negative relationship with volatility. Larger firms, typically characterized by broader operational scopes, greater access to capital markets, and more stable revenue streams, tend to have better risk management capabilities and investor trust. This stability often translates into reduced fluctuations in stock prices, hence lower return volatility. Liquidity also demonstrated a negative and significant association with stock return volatility. Liquid stocks allow investors to enter and exit positions more easily, which helps to dampen large price swings caused by sudden buying or selling pressure. High liquidity reduces market friction and supports more efficient price discovery, contributing to the overall stability of returns.

Dividend payout was found to have a negative, though statistically weaker, effect on stock return volatility. This suggests that firms that consistently pay dividends may be perceived as financially stable and mature, reducing uncertainty and volatility. While not statistically significant in all cases, the negative sign is economically meaningful and aligns with the signaling theory, which posits that dividend payments convey positive information about firm health. Earnings per share (EPS) had a statistically significant negative impact on volatility. Higher EPS reflects strong profitability, which enhances investor confidence and reduces perceived risk. Firms with consistently high EPS are viewed as stable and financially sound, which reduces speculative trading and, in turn, lowers volatility. This finding resonates with Oke et al. (2019), who emphasized that firms with high debt levels are more sensitive to market fluctuations and investor perceptions of risk. This also supports financial distress theory, which states that firms with greater financial obligations are prone to volatility due to the uncertainty of meeting those obligations. Firm size was found to reduce stock volatility, supporting the view by Wangari (2013) that larger

firms offer more stability due to diversification and established operational frameworks. This finding aligns with the Capital Asset Pricing Model (CAPM), where larger firms are generally considered to be less risky. The inverse relationship between liquidity and volatility supports the findings by Suleiman et al. (2021) and Muga (2022), who found that more liquid stocks tend to have narrower bid-ask spreads, more efficient pricing, and less susceptibility to abrupt price changes. This supports Signaling Theory, where firms with higher debt levels send implicit signals of higher financial risk, prompting cautious or adverse reactions from investors. These reactions can heighten volatility, especially when combined with macroeconomic shocks. High leverage also raises concerns about a firm's ability to navigate adverse conditions, making such stocks more reactive to new information

5.3.3 Moderating Effect of Trading Volumes on the Relationship Between Determinants and Stock Return Volatility

The third objective examined whether trading volumes moderate the relationship between the identified determinants (macroeconomic and firm-specific factors) and stock return volatility. The EGARCH model included interaction terms between trading volume and selected variables to test for this moderating effect. The results showed that trading volume significantly moderated the relationship between macroeconomic variables such as exchange rate and firm-specific variables like leverage and liquidity.

In particular, the interaction between trading volume and exchange rate was found to be significant and positive, indicating that during periods of high trading activity, exchange rate shocks have a greater impact on volatility. Conversely, the interaction between trading volume and liquidity showed a negative moderating effect, implying that higher trading activity reduces the impact of liquidity on volatility. These findings highlight the important role of market dynamics and investor behavior in amplifying or dampening the effects of economic fundamentals on stock volatility. This aligns with Sembiring et al. (2016), who found similar results in Asian financial markets. On the other hand, the negative moderation between trading volume and liquidity confirms the role of high trading activity in reducing the impact of liquidity-induced volatility, as demonstrated by Adelegan (2009). According to Mixture of Distribution Hypothesis, high liquidity facilitates faster and more efficient absorption of new information, reducing abrupt price changes. Similarly,

trading volume was introduced as a moderating variable to test its role in amplifying or dampening the effect of macroeconomic and firm-specific variables. The positive interaction between trading volume and exchange rate volatility confirms both the MDH and the Sequential Information Arrival Hypothesis (SIAH), which argue that higher trading volumes often coincide with greater information flow and investor response to macroeconomic news.

5.4 Conclusions

Macroeconomic variables particularly interest rates and exchange rates were found to have a statistically significant impact on stock return volatility. These results confirm the sensitivity of financial markets to changes in the broader economic environment. Inflation and GDP, however, exhibited inconsistent effects, suggesting that not all macroeconomic indicators are equally influential in the short term.

In addition, firm-specific factors such as financial leverage, firm size, and liquidity were also critical in explaining volatility patterns across companies. High leverage was consistently associated with increased volatility, while larger firms and firms with higher liquidity experienced lower volatility. These outcomes support the theory that firm fundamentals are integral in shaping risk dynamics.

Further, the moderating role of trading volume was validated. Higher trading volumes intensified the impact of certain macroeconomic and firm-specific factors on volatility, implying that investor activity and information flow amplify price reactions to shocks. This reflects the behavioral finance perspective where market reactions are not only driven by fundamentals but also by market participation levels.

While a structural break dummy variable was included for the COVID-19 pandemic, the study did not account for multiple breakpoints or other major disruptions during the 2013–2023 period (e.g., election cycles or global commodity price shocks). This may have limited the robustness of volatility modeling in capturing broader macroeconomic turbulence.

5.5 Recommendations

5.5.1 Policy Recommendations

Regulatory authorities such as the Capital Markets Authority (CMA) and Central Bank of Kenya (CBK) should prioritize macroeconomic stabilization through targeted monetary and fiscal tools. For example, the CBK can employ forward guidance, inflation targeting, and interest rate corridors to anchor expectations and reduce excessive volatility in interest and exchange rates. Stability in these macroeconomic indicators enhances investor confidence, thereby contributing to lower stock return volatility.

Additionally, the Nairobi Securities Exchange (NSE) and CMA should strengthen policies on market transparency, including mandatory, timely disclosures on firm fundamentals and market-wide risk indicators. A more transparent market structure can mitigate the impact of speculative trading and herd behavior.

5.5.2 Firm-Level Recommendations

Firms listed on the NSE should adopt data-driven capital structure optimization strategies, such as dynamic trade-off or pecking order models, to reduce reliance on excessive debt during volatile periods. Sector-specific guidance is also essential: for example, financial firms should focus on liquidity buffers and countercyclical capital reserves, while manufacturing firms should consider interest rate hedging instruments to manage macroeconomic exposure.

Moreover, firms should enhance the quality of financial disclosures—specifically on leverage, earnings volatility, and liquidity—to assist investors in making informed decisions. This can be achieved through compliance with International Financial Reporting Standards (IFRS) and voluntary adoption of Integrated Reporting (IR) frameworks.

5.5.3 Investor and Portfolio Management Recommendations

Investors and portfolio managers should monitor macroeconomic variables such as inflation (CPI), interest rates (CBR), and exchange rate movements as part of their risk assessment models. These variables were found to significantly influence stock volatility in the current study.

Furthermore, trading volume was identified as a moderator of stock return volatility. Therefore, investors should incorporate volume-based technical indicators (e.g., On-Balance Volume, Volume

Weighted Average Price) in their strategies to better predict and manage market risk, especially during periods of macroeconomic instability or regulatory changes.

5.6 Contribution of the Study

This study provides empirical evidence supporting the Efficient Market Hypothesis (EMH) and Arbitrage Pricing Theory (APT) in the Kenyan context. The EMH is partially supported by macroeconomic and firm-specific variables, including trading volume, affecting volatility, suggesting markets are not fully efficient in the weak form. APT is supported as systematic risks (like interest rates and inflation) significantly explain stock volatility patterns. The trading volume is a significant factor in contributing to stock returns volatility.

The study also shows that signaling theory is relevant, as firms with poor capital structure and opaque disclosures experience higher volatility, reflecting investor perceptions of agency problems. These findings imply that policymakers, investors, and corporate managers must incorporate multidimensional risk assessments into their decision-making processes.

5.7 Limitations of the Study

Although the study focused on key macroeconomic indicators interest rates, inflation, exchange rate, and GDP there are other relevant factors such as political risk, external debt levels, and global market conditions that were not included. Their exclusion may limit the comprehensiveness of the macroeconomic dimension in explaining stock return volatility

5.8 Areas for Further Research

Further studies can be done on determining whether macroeconomic and firm-specific factors influence volatility across the various sectors on the Nairobi Stock Exchange.Further,research can be done to investigate the impact of investor sentiment, media narratives or behavioral biases on volatility in the Kenyan stock market. A comparative analysis can be extended to other countries to determine whether these findings hold across similar emerging markets.

5.9 Summary of the Chapter

This chapter presented the key findings and derived practical, theoretical, and policy recommendations based on the EGARCH and VAR/VECM models used to examine the relationship between macroeconomic and firm-specific factors, single stock futures, and stock return volatility in Kenya. The findings demonstrated that macroeconomic variables such as interest rates and inflation, along with trading volume and firm fundamentals, significantly influence stock return volatility. The chapter concluded by offering targeted recommendations to regulatory bodies, listed firms, and investors, drawing theoretical implications, and suggesting directions for future research.

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APPENDICES

APPENDIX 1: LISTED FIRMS

Industry	Name
Agricultural	1. Eagads Ltd 2. Kakuzi Plc 3. Kapchorua Tea 4. Sasini Plc 5. The Limuru Tea Co. Plc 6. Williamson Tea Kenya Plc
Auto mobile & accessories	7. Car and General (K) Ltd
Commercial and services	8. Deacons (East Africa) 9. Eveready East Africa Ltd 10. Express Kenya Plc 11. Homebody Entertainment Plc 12. Kenya Airways 13. Longhorn Publishers Plc 14. Nairobi Business Ventures Ltd 15. Nation Media Group Plc 16. Sameer Africa Plc 17. Standard Group Plc 18. TPS Eastern Africa (Serena) Ltd 19. Uchumi Supermarket Plc 20. WPP Scangroup Plc
Construction & allied.	21. ARM Cement Plc 22. Bamburi Cement Ltd 23. Crown Paints Kenya Plc 24. E.A Cables Ltd 25. E.A Portland Cement Ltd
Energy & petroleum	26. KenGen Plc

	27. Kenya Power & Lighting Plc 28. Total Kenya Ltd 29. Umeme Ltd
Manufacturing & allied.	30. B.O.C Kenya Plc 31. British American Tobacco Kenya Plc 32. Carbacid Investments Plc 33. East African Breweries Ltd 34. Flame Tree Group Holdings Ltd 35. Kenya Orchards Ltd 36. Mumias Sugar Co. Ltd 37. Unga Group Ltd
Telecommunication	38. Safaricom Plc
Investment	39. Centum Investment Co Plc 40. Home Afrika Ltd 41. Kurwitu Ventures Ltd 42. Olympia Capital Holding Ltd 43. Trans-Century Plc
Banking	44. Standard Chartered 45. Equity ban 46. Co-operative Bank 47. Bank of Kigali 48. HF Group 49. Kenya Commercial bank 50. NCBA

Insurance	51. Jubilee Holdings 52. Sanlam Kenya plc 53. Kenya Re-Insurance Corporation 54. Liberty Kenya Holdings Ltd 55. Britam 56. CIC
Investment Services	57. Nairobi Securities Exchange
Real Estate Investments Trust	58. Lap Trust-Imara I-REIT
Exchange Traded Fund	59. New gold Issuer9RP)Ltd
Listed Indexes	60. NSE 20 Share Index 61. NSE 25 share Index 62. NSE 10 Share Index

SOURCE: Author compilation

https://www.nse.co.ke/listed-companies/

APPENDIX 11: Ethical Review Certificate Reference Number : SU-ISERC2914/25

Strathmore UNIVERSITY

25th April 2025

Ms Kaimenyi Rachael,
rachael.kaimenyi@strathmore.edu

Dear Ms Kaimenyi,

RE: Determinants of Stock Returns Volatility of Firms Listed on Nairobi Stock Exchange: An Analysis of Macroeconomic and Firm-Specific Factors Moderated by Trading Volumes

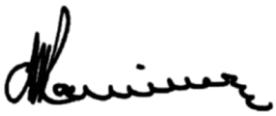
This is to inform you that SU-ISERC has reviewed and **approved** your above **SU- Masters** proposal. Your application reference number is **SU-ISERC2914/25.** The approval period is from **25th April 2025 to 24th April 2026.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification.
iv. Any changes anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to SU- ISERC within 72 hours.
v. Clearance for the export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days of completion of the study to SU- ISERC.

Before commencing your study, you will be expected to obtain a research license from the National Commission for Science, Technology, and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and obtain other clearances needed.

Yours sincerely,



Mr Ambrose Rachier, Chairperson; SU-ISERC

APPENDIX III: SUMMARY OF LITERATURE

Authors	Journal name	Years of study	Region	Theories	Methodology	Macroeconomic	Firm	Effect on Stock return volatility	Trading volume	Research and type of gap
(Olweny & Omondi, 2011)	Economics &Finance review	2001 to 2010	Kenya	Fisher's theory, Interest rate theory, Arbitrage pricing theory	EGARCH TGARCH	Foreign exchange rate, interest rate, inflation rate	None	All the three macroeconomic variables affect stock return volatility at NSE.The returns are symmetric but leptokurtic and thus normally distributed .Volatility of the returns is not highly persistent, and the leverage effects are significant.	Not researched	Trading volume is not included in the analysis . Knowledge gap and period gap.
(Onono et al,2014)	International Journal of Economics and finance	2000 to 2012	Kenya	-	TGARCH	Gross Domestic Product, Treasury bill rate, Exchange Rate, Inflation	None	Negative relationship between exchange rate and stock returns. Exchange rates affect stock returns. The other macroeconomic variables do not explain stock returns. The effect of the macroeconomic variables revealed that the impact of the news is asymmetrical and that there were leverage effects. Negative shocks (bad news) about the macroeconomic variables had a larger effect on conditional volatility of stock returns than positive shocks(good news)of the same magnitude.	Not researched	Trading volume is not included in the analysis . Knowledge gap and period gap

(Owidi & Waweru, 2016)	Journal of Finance and Economics	2003 to 2013	Kenya	Efficient Market Hypothesis	FIEGARCH	None	None	Asymmetric and Conditional volatility among the stock returns on NSE in Kenya	Not researched	Period and knowledge gaps. It does not include firm-specific attributes and macroeconomic factors in the analysis of stock returns volatility.
(Gichungu & Mukoma, 2024)	Scholarly Research Journal for Interdisciplinary studies	2009 to 2018	Kenya			Money supply, rates of interest, rate of inflation and rates of exchange	None	Money supply had a positive significant ,inflation had a negative and non-substantial effect ,interest rate had a negative and substantial effect, exchange rate had a negative and non-substantial impact on stock return volatility.	Not researched	Trading volume is not included in the analysis . Knowledge gap and period
(Kalu & Okwuchukwu, 2014)	International Journal of Empirical review	Nigeria	1996 to 2013		GARCH-X	Broad money supply, Consumer price Index, credit to the private sector,US dollar/Naira Exchange rate and net foreign assets	None	NSE Return volatility is positively influenced by changes in US dollar/Naira exchange rates and credit to private sector but negatively influenced by changes in broad money supply and inflation. On the other hand,changes in net foreign assets showed negative but not significant influence on changes in stock market return volatility.	Not researched	Regional gap and knowledge gap

(Khan et al,2018)	Business & Economics Review	Pakistan and US	2000 to 2015		GARCH and E-GARCH	Exchange rate, oil returns, risk free rate	None	A negative relationship is observed regarding market returns, exchange rate and oil returns for the majority of the firms. Risk free rate showed positive and negative effects on the stock returns of majority firms in NYSE and PSX markets, respectively.	Not researched	Regional and knowledge gap
(Pinjaman & Aralas, 2015)	South East Asia Journal of Contemporary Busines, Economics and Law	Malayasia	Not mentioned		EGARCH,OLS	Gross Domestic product, exchange rate, interest rate, inflation rate, money supply,economic crisis, and economic liberalization	None	The stock returns volatility is persistent. All selected economic variables are significant in affecting stock returns volatility where inflation, exchange rate and economic growth proved to be major determinants of the performance of stocks in all sectors. The investigation also showed economic factors except for economic growth are positively related to stock return volatility.	Not researched	Regional and knowledge gap
(Pertiwi & Wiagustini, 2020)	American Journal of Humanities and Social Sciences Research	Indonesia	2014 to 2018	Signaling theory	Multiple linear regression	None	Dividend payout ratio,leverage,firm size	Dividend payout ratio and leverage and firm size simultaneously have a significant effect on stock price volatility. Dividend payout ratio and leverage have no significant effect on stock price volatility. Firm size significantly affects stock price volatility	Not researched	The stock returns volatility is not measured. Regional gap and Knowledge gap

(Oluoch et al.2019**)**	International Journal of Business Management and Economic research	Kenya	2008 to 2016	Cashflow theory, pecking order theory, trade off theory	Panel regression model	None	Cashflows, leverage and firm size	The study showed that both cashflow and leverage have significant effect on stock returns of non-financial listed companies in Kenya. Including the firm size, the significance of the two independent variables (cashflow and leverage) to dependent variable improves	Not researched.	The study only studied non-financial firms listed on NSE in Kenya. Hence a knowledge gap.
(Ajao & Robinson, 2022)	International Journal of Finance Research	Kenya,Nigeria,South Africa	2011-2019		GARCH, ARDL	None	Leverage, firm size, dividend yield,EPS,Dividend payout	The study concluded that dividend payout, dividend yield and earnings per share are significant factors that can be used for predicting volatile movement in stock price in African stock markets.	Not researched	It does not look into the combined effect of the various factors. It looks at price volatility and not returns volatility Henc e knowledge gap.
(Susmel et al,2012)	Global Finance Journal	Ten Asian countries	1998-2017		Bivariate GJR-GARCH	None	None	There exists a positive contemporaneous relationship in Hong Kong,Korea,Singapore,China,Indonesia and Thailand. A negative relationship in Japan and Taiwan. We find a significant asymmetric effect in all sampled countries	Researched	It does not consider macroeconomic factors, and firm specific factors influence the stock returns gap. This is a knowledge gap.
(Bose & Rahman,2015)	Applied Economics	Bangladesh		Mixture of distributions	GARCH	None	None	Trading volumes and stock returns volatility are positively related for some firms listed on Bangladesh Stock Market.	Researched	It does not consider macroeconomic factors, and firm

				Hypothesis						specific factors influence the stock returns gap. This is a knowledge gap.
(Simwa et al,2021)	Research in Mathematics and Science	Kenya	2001 to 2017		GARCH, GARCH-M,EGARCH	None	None	Volatility persistence decreases when trading volume is included in the model	Researched	It does not consider macroeconomic factors, and firm specific factors influence the on-stock returns volatility. It only analyzes the stock Index (NSE20) This is a knowledge gap.