EFFECT OF MACROECONOMIC VARIABLES ON PORTFOLIO RISK OF COMMERCIAL BANKS LISTED ON NAIROBI SECURITIES EXCHANGE

By

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A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MSC COMMERCE IN SCHOOL OF BUSINESS AND PUBLIC ADMINISTRATION AT

KCA UNIVERSITY

NOVEMBER, 2014

DECLARATION

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

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And have certified that all revisions that the dissertation panel and examiners recommended have been adequately addressed.

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Dissertation Supervisor

EFFECT OF MACROECONOMIC VARIABLES ON PORTFOLIO RISK OF COMMERCIAL BANKS LISTED ON NSE

ABSTRACT

This study sought to establish the effect macroeconomic variables on Portfolio Risk of commercial banks listed on the NSE for the period 2004 to 2013 and sought to empirically establish the impact of interest rates, exchange rates and economic growth on portfolio risk in Kenya. In construction of portfolio investors rely on various indicators which are expected to determine the risk and return of the investments. However, the situation in Kenya is such that investors seem to ignore the determinants of risk and return of investments. This is evidenced by instances where investors use the gut feeling or use herd behavior when picking stocks for instance during the KenGen and Safaricom IPO. The research used secondary quarterly data for 11 financial institutions listed at the NSE and adopted an explanatory research design. In order to achieve the stated objectives the research adopted a time series multivariate regression analysis. Engle-Granger Cointegration tests was performed and the empirical results indicated that the variables were cointergrated and an Error Correction Model (ECM) was thus adopted. The Error Correction Model indicated that 52 percent of the variation in portfolio risk was explained in changes in the Interest rate, foreign exchange rate and GDP growth rate and that the Interest rate had a negative and significant relationship with the portfolio risk whereas the other variables were insignificant. The research concluded that despite the observed relationship between the variables policies designed should be meticulously be designed so as to maximize on the returns from investment in various portfolios as policies play a very crucial role in informing investors' decision to undertake investment opportunities. Based on the study findings, two recommendations were provided based on the objectives of the study. First given that the relationship between interest rates and portfolio risk was negative and significant it is recommended that despite the fact that an increase in interest rate is associated with a decline in the portfolio risk a policy aimed at reducing the portfolio risk faced by investors should consider among other things such as inflation rates as an increase in the interest rate with the intention to reduce the portfolio risk by investors may end up discouraging investors from investing in these portfolios. Secondly, given the significant positive relationship between GDP growth and portfolio risk, it is recommended that in making decisions of whether to invest in portfolio stocks listed at the NSE, investors should consider the economy's overall performance as proxied by the GDP growth rate. Despite the fact that the relationship was positive for the period of study, the dynamic nature of the stock market should also be consider so as to ensure that sound investment decisions are made.

Key Words: Economic growth, Interest Rates and Exchange Rates

ACKNOWLEDGEMENT

I am deeply grateful to my supervisor, Professor Silas Onyango, for his helpful role in guiding me through the entire process of coming up with this dissertation without which this would not have been a success.

I would also like to acknowledge Nairobi Securities Exchange for granting me the access to the various data that were used for this study

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DEDICATION

I dedicate this dissertation to my wife Damaris, my two children Lovely and Stacey and not forgetting my mother who persevered through my long periods of absence and encouraged me to keep on and always praying for me to get that extra strength to undertake my studies

ACRONYMS AND ABBREVIATIONS

APT	Arbitrage Pricing Theory
CAPM	Capital Asset Pricing Model
CBK	Central Bank of Kenya
KNBS	Kenya National Bureau of Statistics
NSE	Nairobi Securities Exchange
OLS	Ordinary Least Squares

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The stock market is said to fluctuate every week, and as a result investors need a safety net to cushion them from the risk associated with these fluctuations, diversification can help mitigate the potential risks and thus help them avert the likelihood of their entire stock portfolio from losing value. Despite the fact the diversification is not an all fit solution it helps investors to reach their long-term financial goals while reducing the level of risk. Similarly, investors should keep in mind that diversification does not reduce the risk level down to zero and they are still likely to encounter risk but of less magnitude (Bekaert &Harvey, 2002; Henry, 2000).

Risk in this case is defined as the probability or likelihood of an investments return to be different from the expected. This would include the possibility of the original investment being lost. The more the disposable the income of an individual the more they are willing to take risk, and thus are considered as being risk lovers, but on the other hand the less the disposable income an individual has the more the risk averse they are (Pavabutr& Yan, 2003).

With risk and returns associated with an investment investors must therefore strike a balance, and thus are faced with a risk-return tradeoff. The risk return trade-off will require investors to make a decision regarding their lowest desired level of risk and the highest possible risk they are willing to face. If an investors chooses a lower level of risk they should as well be contended with the low returns, while a level of risk that is higher is usually associated also with a potential return that is higher (Stulz, 2009).

The standard deviation is the most commonly used in computing risk. The standard deviation measures how the actual return deviates from the expected returns and is computed

by taking the square root of variance and thus variance is also one of the commonly referred concepts in determination of risk (Frankel, 2011).In determining the variance the difference between the actual and expected return is calculated and the outcome is squared to obtain the variance. To get the standard deviation the square root of the variance is computed and this is the risk associated with the stock. If there are two potential investments whose expected returns are similar then the one with a lower standard deviation would be most preferred as the risk associated with that investment is less (Rime, 2001).

The motive of individuals and investors investing in stocks is the anticipation or returns from them in monetary terms. Most institutional and individual investors invest I stocks with the anticipation of monetary benefits as returns to their investments. As a result the great anticipation of stock returns this usually leads to massive subscription of the public offers. Given the limited resources that the investors have, one of the most challenging tasks to them is where to invest their resources so as to maximize their future benefits (Bebczuk & Galindo, 2008, Berger et al. 2010; Winton, 2009).

Macroeconomic determinants of portfolio risk relates to all the variables that influence the variability of stock returns. This includes interest rates, foreign exchange rates, inflation rates and GDP. Empirical evidence show that interest rates have a positive relationship with variations of stock returns, for instance when the interest rates increases the portfolio risk also increases as investors sell stocks and purchases bonds (Kidenda, 2013).

1.1.1 Portfolio risk in developed economies

In Russia, Goriaev (2004) found that for firm listed on the Russian Stock Market, the difference in return for companies which were susceptible to risk in their country and whose profit are stable was about 59% premium. They also indicated that 25% of the risk premium was accounted by corporate governance, while 33% was accounted for by the traditional size and 39% was accounted by the dollar factor.

For the Bulgaria stock market, it is characterized by high risk, volatility clustering, autocorrelations which was caused by non-synchronous trading, leptokurtosis and non-normality (Petev & Kanaryan, 2005). These characteristics are in coincidence with those of a typically emerging stock market (Harvey, 1995 & Bekertet al., 1998).

In the Japanese economy, equity risk premium from a supply side estimate indicated that it was nearly or almost zero since 1970s. The primary causes attributable to this low risk premium was the decline in the Return on equity and more particularly on the high corporate income tax imposed on shareholder's earnings by the Japanese government. To ensure that investors therefore get high returns from their investments associated with the risk they shouldered, the corporate sector made efforts to increase the return on equity; this was also boosted by the government, where they lowered the burden of corporate tax so that investors were not hurt (Yamaguchi, 2005).

1.1.2 Portfolio risk in emerging economies

The Bilbao stock Exchange, a stock exchange market in Spain found strong convincing evidence in support of autocorrelation and the Generalized Autoregressive Conditional Heteroskedasticity effects, and no risk-return relationship evidence found. In addition, a weak evidence of a contemporaneous effect of trading volumes on returns exists (Battilossi & Houpt, 2006). These findings are consistent with similar studies on emerging markets such as Omran & McKenzie (2000).

In the Chinese Stock exchange Market the risk-return relationship of daily, weekly and monthly stock price returns revealed that the Shanghai and Shenghen Stock Markets the dynamic risk-relationship are quite different using GARCH-M models. The daily returns in Shenghen Stock Exchange found a significant positive risk-return relationship. This observed relationship between returns became insignificant with lower frequency, inconsistent to Shenghen Stock Exchange findings. In Shanghai Stock Exchange the stock's return

conditional mean is negative and insignificantly related to its conditional variance, except for a positive and insignificant relationship for the daily returns in the Generalized Autoregressive Conditional Heteroskedasticity-in-mean model. In conclusion, the Generalized Autoregressive Conditional Heteroskedasticity-in-mean Model appears to explain the dynamic performance of the stock returns better than other Generalized Autoregressive Conditional Heteroskedasticity type models (Menggen, 2007).

In Malaysia, Marcucci and Quagliariello (2009) in their study found evidence of varying degree of riskiness in portfolio during various phases of the economic cycles. They document that opening out efforts of riskier banks are four times more affected during periods of recessions than less-risky banks. Riskier banks are also three times more affected by the impact of economic conditions during recession than less-risky banks. This implies that strategizing bank portfolios is crucial, particular when structuring lending, because it has a different impact on bank risk exposure in different economic cycles. In the Malaysian context, Ahmad and Ariff (2004) found that lending to risky sectors is negatively related to the market risk exposure of depository institutions

In the case of Banks in India they manage risk exposures arising from various risk category silos by following the set norm by the Reserve Bank of India. The prudential norms as set out by the RBI includes internal reporting and limit systems based on nominal exposure amounts among other norms. The gross and net limits were used to monitor bank's levels of exposure. According to Carey (2000) credit limits monitoring by banks internationally has been a part of credit risk management. Similarly, according to Cowan and Cowan (2004) the US sub-prime lenders used limits on dollar either by borrower or by geography to better manage exposure to credit risk. However, deliberation of risk mitigation approaches cannot be established under stressful market conditions since they cannot be explicitly captured in most measures. In this perspective, unknown correlation layers (particularly the systematic

risk factor) should be well-understood to appraise the concentration risk tolerance level in line with the solvency target as laid down by banks.

1.1.3 Portfolio risk in African economies

In South Africa, it was observed that interest rate risk exposure, whether linked to earnings or economic value; utilize, in some particular form, forecasts of the potential path of future interest rates. As a result, banking institutions needs to incorporate interest rate changes sufficiently large enough to cover the risks they are likely to face and should also consider the use of multiple scenarios, including potential effects of changes in the relationships among interest rates (Olena & Emilia, 2006).

In the Uganda securities Exchange, stock brokers usually make an erroneous assumption that all stocks have the same risk. The implication of this erroneous assumption is that companies have always been wrongly valued. For this stock exchange it is perceived that commercial bank finance is more expensive than equity finance. In light of this companies seeking long term funds should first get listed to get listed as this turn out cheaper than relying on short oriented commercial banks loan (Mayanja & Legesi, 2007).

The risk and return next frontiers is also characterized by small less risky and valued stocks than large and growth stocks. The greatest impact on risk premiums is attributable to economic, financial and Political factors. Some factors that influence the return generating process in developed markets may behave differently in frontier markets (Girard & Sinha, 2008).

1.1.4 Portfolio risk in the Nairobi Securities Exchange

The financial sector is mainly composed of companies from the banking industry, insurance companies, micro finance institutions, mutual funds, capital markets and development finance institutions (CBK, 2007). Banks in Kenya, are the most important players in provision of financial services and there outreach is deeper than that of any other

type of financial (ICA, 2002). They provide savings, credit and insurance services to a large portion of the population. In 1989, various financial sector reforms through structural adjustment programs were adopted supported by World Bank. These financial sector reforms included interest rate and exchange rate liberalization which was eventually attained in July 1991 and October 1993 respectively. From the year 2010 new developments and intense competition in lending industry in Kenya's economy has been witnessed since the introduction of the economic liberalization which has posed serious challenges to the banks. The failure to exercise sufficient caution in credit provision by banks has often led to many banks in the country experience credit losses. When credit is allocated to highly leveraged borrowers, there is likely to be experienced large default losses. Similarly, debt restructuring and buyout strategies as well as structures that involve customer-written options introduce risks into a bank's portfolio and thus should only be used with financially strong customers. However, such kind of structures are most appealing to weak borrowers since the deal would enable a significant upside gain if all goes well, while the borrower's losses are restricted to its net worth (Uchendu, 2009).

1.2 Statement Problem

In construction of portfolio investors rely on various indicators which are expected to determine the risk and return of the investments. However, the situation in Kenya is such that investors seem to ignore the determinants of risk and return of investments. This is evidenced by instances where investors use the gut feeling or use herd behavior when picking stocks for instance during the KenGen and Safaricom IPO. The implication of this is that investors do not use models to determine the choice of stocks, either because the models are complex or are not consistent. Many models on the determinants of portfolio risk exposure have been done (Bhole&Mahakud, 2009; Chau, 2012) advocate for the use of the CAPM in estimating the portfolio risk. Merton (2003) and Riley (2003) also propose that the Inter Temporal

Capital Asset Pricing Model is better than the Capital Asset Pricing Model in the estimation of portfolio risk. Bai and Green (2008); Eita, (2011); Chau (2012) have also proposed that Arbitrage Pricing Model as a better approach in establishing the factors determiningportfolio risk.

Locally Beck, Cull, Fuchs, Getenga, Gatere, Randa and Trandafir (2010), conducted a study on Kenya's financial sector with an emphasis on stability, efficiency and outreach but failed to establish the determinants of portfolio risk. Kidenda (2013) conducted a study on determinants of stock returns of commercial banks in Kenya but also failed to establish the determinants of portfolio risk. Olweny and Omondi (2012) also conducted a study on macro-economic factors on stock return volatility and also failed to establish the determinants of portfolio risk.

Local studies (Beck et al., 2010, Kidenda, 2013, Olweny & Omondi, 2012) and non-local studies (Bhole & Mahakud, 2009; Bai & Green, 2008 and Chau, 2012) attempted to establish the determinants of returns and failed to focus on the risk aspect. The scarcity of studies in Kenya on the effect of macroeconomic variables on portfolio risk of commercial banks listed on NSE forms the knowledge gap. It is for this research gap that this study sought to bridge.

1.3 Research Objectives

1.3.1 General objective

The general objective of the study was to establish the effect of macroeconomic variables on portfolio risk of commercial banks listed on NSE.

1.3.2 Specific objectives

The specific objectives were:-

i. To determine the effect of interest rates on portfolio risk in Kenya

ii. To establish the effect of exchange rates on portfolio risk in Kenya

iii. To determine the effect of economic growth on portfolio risk in Kenya

1.4 Research questions

The following were the study's research questions:

i. What is the effect of interest rates on portfolio risk in Kenya?

ii. What is the effect of exchange rates on portfolio risk in Kenya?

iii. What is the effect of economic growth on portfolio risk in Kenya?

1.5 Scope of the study

The study's scope was on 11 listed banks at NSE. The data was quarterly and run for 10 years from 2003-2012. This implies that the number of lags were 40 quarters.

1.6 Significance of the Study

The study is important to various stakeholders among them being the management of listed banks in Nairobi Security Exchange (NSE), policy makers in both private and public sector and also scholars. Management of listed banks in Nairobi Security Exchange out of this research appreciates the determinants of portfolio risk exposure among the listed banks. For example through the findings of this study, they understand the link and craft policies which may lead to the portfolio risk exposure. The study is useful to policy makers in their effort to revamp their listed banks in Kenya through understanding the determinants of portfolio risk exposure and also regarding capital base, financial strength and other regulatory requirements of the banking companies. The study contributes to development of academic literature and theory by providing empirical evidence in this field of study. These groups of scholars use the research to add on their wealth of knowledge and constitute. The study identified gaps that can be advanced in the interest of further scholarly discourse in the area of portfolio risk exposure. The study guides other researchers who may wish to do a similar study in the other East Africa community member (EAC) Countries securities markets due to shared similarities.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents the theoretical literature and the review of previous empirical studies that are relevant to this study.

2.2 Theoretical Literature

The theories reviewed in this chapter include the Portfolio Theory of Investment, Capital Asset Pricing Model and Arbitrage Pricing Theory.

2.2.1 Investment theory of portfolio

The portfolio theory is an investment approach in which the investor balances risk against expected return to maximize earnings from an entire portfolio. The essence of Portfolios is to increase returns and to reduce investment risks. For this reason, portfolio selection strategies have received quite some attention in financial literature.

With the modern theory of portfolio investment Mean-variance analysis is introduced as this simplifies the problem associated with portfolio selection. Markowitz (1959) quantified risk and showed how the process of portfolio diversification reduced investors' risk. In order to determine the portfolio risk, the standard deviation of the return in a given period of time is computed, this process of computing the portfolio risk thus helps in determining the most efficient portfolio, a portfolio that minimizes the risk from a return for a fixed period.

According to the portfolio theory, the larger the expected return the better the investment, and the smaller the standard deviation of the return the more attractive the investment. Furthermore, the theory shows that we can reduce the standard deviation of the return or risk by combining anti-covariant securities. However, each class of assets has a different associated risk-return profile and behaves uniquely. One class of the asset may be

increasing in its value while the other may be diminishing and vice versa. According to Sharpe (1964) this theory, however, has a shortcoming; it cannot allow both more and less risk averse investors to find their optimal portfolio, a problem surmounted by CAPM. The CAPM theory explains the risk of a particular asset or portfolio using the excess return on the market portfolio (Linter, 1965) by suggesting that investors should hold diversified portfolios, and predicts that investors will hold some fraction of the market portfolio.

2.1.2 The Capital Asset Pricing Model (CAPM)

This theory was postulated by Sharpe (1964).The model makes very strong assumptions. It is hypothesized that the market portfolio is on the efficient frontier and in addition it is considered to super-efficient Tobin's portfolio. According to this theory, investors should hold the market portfolio, whether leveraged or not, with positions in the risk-free asset.

This model makes several assumptions, whereas diversification reduces investors' exposure to firm explicit risk, a good number of investors constrain their diversification to holding just a few assets. The reasons why investors stop diversifying their portfolio is twofold. First, investors receive more benefits of diversification from a relatively small class of portfolios. The marginal benefits derived from more portfolio diversification diminish as more and more diversification is pursued by the investors of mutual fund managers. Consequently, the benefits from increased diversification may not adequately compensate for the marginal costs of diversification, which includes monitoring and transaction costs. Secondly, by limiting diversification fund managers and investors believe they can find assets which are undervalued assets and thus opt not to hold those assets in which they perceive to be fairly or overvalued.

Variation of portfolios by investors is enhanced by the existence of assumptions as no additional costs are incurred. At the cutting edge, despite the portfolios of these investors

including every traded asset in the market they still have identical weights on risky assets. The inclusion of all traded assets in the market in the diversified portfolio is the reason as to why they are regarded as market portfolio. This should not be an unexpected result, since the advantages of diversification and the exclusion of transactions costs is incorporated in the capital asset pricing model. This brings about an argument that holding a small proportion of every traded asset in the market stands out as the optimal choice. This argument is supported by the fact that diversification minimizes exposure to firm-specific risk and there are no costs linked to adding more assets to the portfolio. Assuming that this is conceptual, then the market portfolio is an exceptionally well spread mutual fund constituting of stocks and real assets, and treasury bills as the riskless asset. Hence, in the CAPM, all investors will hold blend of treasury bills and the same mutual fund (Sharpe, 1964).

2.2.3 Arbitrage pricing theory

The theory of Arbitrage Pricing Theory is a one period model that was developed by Ross (1976). With regard to this model, investors concur with the fact that stochastic properties of returns of capital assets are in line with a factor structure. According to Ross, equilibrium price which fail to offer arbitrage over those portfolios that are static because the expected returns from these assets to be approximately linearly related to the betas (Ross, 1976). The linear relationship between the expected returns and the betas or factor loadings is equivalent to the recognition of the stochastic discount factor.

Basically, the argument for this theory relies on the anticipation of arbitrage. In this theory Ross (1976) argues that for equilibrium to be attained, the linear pricing relation is a vital condition particularly in a market where agents aim at maximizing some form of utility. Hence, the consequent work is derived either from the assumption of the anticipation of arbitrage or the utility-maximization equilibrium (Ross, 1976)

This theory was proposed by Ross (1976) as an alternate for CAPM introduced by Sharpe (1964). It is considered an alternative since both argue that a linear relationship exists between the expected returns of assets and their covariance with other random variables. With regard to CAPM the covariance is the market portfolio return and is explained as the amount/level of risk that investors cannot avoid in any way by diversification. In this relationship between expected returns and the covariance, the slope or gradient coefficient is referred to as the risk premium. Consequently, since a test of the APT it is not sufficient to explain that a set of betas of portfolios satisfies the linear relation threshold between the covariance and expected returns.

2.3 Empirical Literature Review

Below are empirical studies according to the objectives

2.3.1 Effect of Interest Rates on Portfolio Risk

Beck, Cull, Fuchs, Getenga, Gatere, Randa and Trandafir (2010) looks at Kenya's financial sector with an emphasis on stability, efficiency and outreach. In order to examine the level of or efficiency of financial intermediation the interest rate spread is used as a proxy. Their study used ex post construed spreads, where these spreads were decomposed into a different set of factors including overhead costs, taxes and loan loss provision. Kidenda (2013) in his study examined volatility in interest rates, exchange rates and inflation rate had a cause-effect on the financial institutions returns in Kenya for the period January 2006 to June 2012. This study used the monthly returns of five banks that were listed at the NSE. The study concluded that exchange rate was the most predominant and significant in explaining the variations in stock returns. The observed relationship was negative in the long run. It was also concluded that the short run historical stock values exerted an impact on the current period's stock returns. Similarly, the study concluded that the short run risk free rate and short run inflation exerted an influence on the current period's stock returns.

Olweny and Omondi(2012) in their study examined the impact of macro-economic factors on stock return volatility. The study used monthly data spanning the period 2001 to 2010 and adopted both EGARCH and TGARCH models. The study found that the returns to stocks were symmetric but leptokurtic and not normally distributed. The study also found out that stock return volatility was affected by changes in foreign exchange rates, interest rates as well as variations in inflation rates. In detail the magnitude of volatility as explained by foreign exchange rate was relatively low at 0.21 but this relationship was significant implying that the effect of foreign exchange rate on stock returns is low. The persistence of stock Volatility was established to be significant and low implying that the effect of shocks takes a short time to dissipate. Evidence of leverage effect (λ=0.6720) was established implying that volatility rise more following a large price fall than following a price rise of the same magnitude.

Nampewo (2013) examined the determinants of interest rate spread for the banking sector in Uganda for the period 1995-2010. This study used the Engle and Granger two-step to test for Cointegration between the bank rate, exchange rate volatilities, treasury bill rate, the ratio of broad money to GDP as well as the proportion of non-performing to total private sector credit. The results from this study indicated that the interest rate spread is positively affected by the treasury bill rate, bank rate and non-performing loans. The study also found that the ratio of broad money to GDP (M2/GDP) and the real GDP had a negative and significant influence on the interest rate spread in Uganda. However the analysis is undertaken at macro level hence concealing micro and bank-specific characteristics.

Mannasoo (2012) in his study investigated the role played by the global financial crisis on the interest spreads in Estonia. The methodological approach used in this study followed the approached adopted by Ho and Saunders (1981), where spreads were decomposed into two different components. One of the components was a pure spread while

the second component was the component that was explained by the market structure factors. The first component which is the pure spread was explained by the extent of bank risk aversion and the market structure faced by the banking industry. It was found that the volatility of money market interest rates had a long-run impact on the spread. It was also established that the bank's efficiency, regulatory variables and bank-portfolio effects influenced the interest margins. Credit risk was found to contribute a minimal role whereas higher bank liquidity was associated with lower interest margin.

Gambacorta (2004) also, studied factors that influenced cross-sectional differences of bank interest rates in Italy by considering both microeconomic and macroeconomic factors. The variables used in the study were loan and deposit demand, the structure of the industry, operating cost, impact of monetary policy through changes in policy rates and reserve requirements, and credit risk and interest rate volatility. The results indicated that those interest rates on short term lending of liquid and well capitalized banks react less to monetary policy shocks.

Brock and Franken (2003) examined interest rate spread in Chile, this study found that business cycle variables, monetary policy as well as the influence of industry on interest rate differed depending on whether the spreads were computed from disaggregated loan and deposits data or whether they were computed from data in the balance sheets.

2.3.2 Effect of Exchange Rates on Portfolio Risk

In the study of Biger (2009) it is revealed that form an international perspective, taken as a whole the rate of return from holding foreign financial assets consists of investment return on the assets plus gains and losses from the movements in exchange rate. The fluctuation of exchange rate is additional source of uncertainty that may generate both potential gains and losses to investors across countries. Besides, his work reveals that the movements in exchange rate drastically increase foreign investment risk in holding bonds and

stocks; nevertheless, the impact of exchange rate movements on international investment risk for bonds is significantly greater than for stocks due mainly to the reason that stocks are more volatile when compared with bonds.

Eun and Resnick (2008) examine the impact of exchange rate fluctuation on the risk of foreign stock market investment and reveal that under the Modern Portfolio Theory (MPT), investors estimate the risk-return characteristics of financial assets when constructing optimal portfolios. In this case, exchange rate variation leads to the portfolio risk. On the contrary, according to efficient international portfolio strategy, the fluctuation of exchange rate is rather important to multinational investors owing to its capability to capture the potential gains from international diversification. Further, they also conclude that the exchange rate variability accounted for fifty percent of the dollar returns variability from equity investment in countries such as Germany, Japan, and the U.K.

Prasad and Rajan (2005) investigates the effect of interest rate risk and currency on equity valuation in five countries and find that exchange rate fluctuation is priced in most markets while interest rate risk is not priced in any countries. Solnik (2005) studies the link between exchange rate variation and risk as well as return on foreign investment covering the period 1994 to 2004. They concluded that contribution of variation in exchange rate to the aggregate investment risk is rather small whether investment in a single stock market index or investment in an internationally diversified portfolio of stock market indices. In case of the contribution of currency variation to return on investment, his results further show that exchange rate variation is the major source of investment return in short time. For long periods of time, capital gains or investment income is the determinant of return on a diversified portfolio simply because an appreciation of one currency is generally offset by a depreciation of another.

2.3.3 Effect of Economic Growth on Portfolio Risk

It is abundantly documented that a growth portfolio is outperformed by a value portfolio over long periods in most markets worldwide. Despite this observation, it is not well known how this outperformance is achieved. Chaves and Arnott decomposed the total returns of these strategies and found that the value portfolios earn higher dividend income, the average growth stock enjoys faster dividend growth than the average value stock, but surprisingly and value portfolios experience higher growth in dividends than growth portfolios. The finding is an effect of the nature of the rebalance rules for value and growth portfolios. The rebalancing rules ensures that lower yielding value stocks are replaced with new higher yielding value stocks and replaces higher yielding growth stocks with new lower yielding growth stocks. It is, therefore, the act of rebalancing and reconstituting the growth and value portfolios that increases the growth rate for dividend income in value strategies and rather sharply reduces it in the case of growth strategies (Chaves & Arnott, 2012). Quaden (2004) asserts that a banking system that is efficient benefits the real economy by allowing 'higher expected returns for savers with a financial excesses, and lowers the borrowing costs for investing in new projects that need external finance.

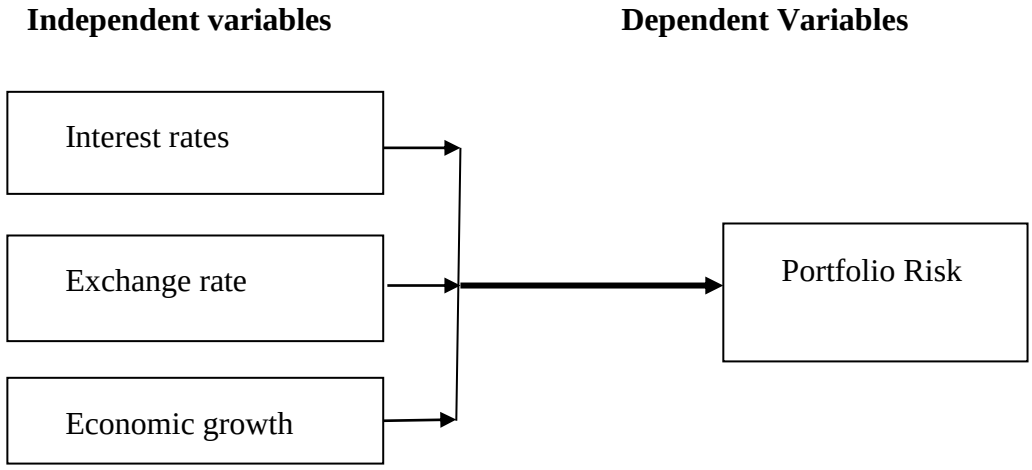
Huang, Zhou, and Zhu (2009) conducted a study to investigate the sources of financial instability and to also allocate each financial institution with its respective systemic portfolio risk. They defined systemic risk as being cost incurred to cushion against distressed losses in a banking system, which is a risk-neutral concept of capital based on publicly available information that can be appropriately aggregated across different subsets. An application of the methodology to a portfolio of twenty-two major banks in Asia and the Pacific illustrates the dynamics of the spillover effects of the global financial crisis to the region.

2.4 Conceptual Framework

A conceptual framework sets out the actualization process of the entire research process. In this case the predictor variables and the outcome variables are presented. The predictor variables in this study being interest rates, Gross Domestic Product growth rate while the outcome variable was portfolio risk.

FIGURE 1

Conceptual Framework



2.5 Operationalization of Variables

Portfolio risk adopted for the study was computed as a standard deviation of the quarterly returns of the bank's share prices. The returns of the banks were summed up, a mean obtained and this was used to compute the standard deviation. The prices for computing returns were obtained from NSE reports.

$$\text{Returns} = \frac{p_t - p_{t-1}}{p_{t-1}} * 100$$ …….. Equation I

Where;

P_t– Price of shares in the current period

P_{t-1} – Price of shares in the previous period

Cumulative Returns=Return Bank 1+Return Bank 2+ Return Bank 3+…+Return Bank N

$$\text{Mean Returns} = \frac{\text{cumulative Returns}}{N}$$

$$\text{standard deviation} = \sqrt{\frac{\sum(\text{Returns} - \text{Mean Returns})^2}{N - 1}}$$

Here; N – Number of banks used in the study

The standard deviation of share prices was used to obtain the portfolio risk. The returns of the banks was summed up, a mean obtained and was to compute the standard deviation. The prices for computing returns were obtained from NSE reports.

A significant positive relationship is expected between interest rates and portfolio risk. Similarly, Exchange rates are expected to have a positive and significant relationship with portfolio risk while the expected relationship between Economic Growth rates and portfolio risk is positive and significant.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The proceeding sections of this chapter outlines the research methodology or research design, the population and sample of the study, data collection method and instruments and finally presents the analytical model.

3.2 Research Design

An exploratory research design was adopted. An explanatory research design is used to show how variables relate to each other. According to (De Vaus, 2001), explanatory research answers the why questions and this therefore involves developing the causal explanations among variables in a study which also according to (Mugenda & Mugenda, 2003) aims at establishing a cause and effect between variables. The dependent variable is quarterly portfolio risk for the year 2003 to 2012 (10 years or 40 quarters). The independent variables are exchange rates, interest rates and Economic Growth rate

3.3 Target Population

According to Cooper et al. (2000), a population is defined as the total elements with which a research wishes to make focus on and thus make inferences from it. The target (accessible population) was 11 listed banks as shown in appendix 1

3.4 Sample

The study used a sample size of 11 banks. This implies that a census methodology was used as the numbers of banks listed were few.

3.5 Data Collection Procedures

Secondary sources of data used in the study were obtained from the NSE, CBK and KNBS reports. The stock prices used to compute the portfolio risk was obtained from the NSE whereas the 91- TB rate used as the interest rate proxy was obtained from the CBK and

finally, the GDP and exchange rates were obtained from the KNBS. The scope of the study was 11 listed banks at NSE. The study used quarterly time series data for the period 2003-2012 (ten years). The total numbers of observations were thus 40 (10years X 4 Quarters)

3.6 Analytical model

The data was modeled in time series. A multiple linear regression model in the form below was adopted.

$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + e$ ..... Equation II

Where;

Y= Portfolio risk (standard deviation of return) (dependent variable) at time t

X_{1t}– Interest rates over time

X_{2t}– Exchange rates overtime

X_{3t} – Economic Growth overtime

β_0 - The constant term

β_1– Interest Rates regression Coefficient

β_2 -Foreign exchange rate regression coefficient

β_3– Gross Domestic Product growth rate regression coefficient

e - Error term, with (μ=0,σ^2)

Expected outcomes of the variables after running the regression model

TABLE 1

Expected sign of Coefficients

Variable	Expected Sign of Coefficient
Interest Rates	Positive
Exchange Rate	Positive
Economic Growth	Positive

3.6.2 Time Series Methodology

Step 1: Trend Analysis

The first part of the time series analysis is on the trend analysis of the variables used in the study. Generally, the trend analysis allows for the observation of the movements of variables over time and thus depicting the pattern of movement.

Step 2: Unit Roots Test

The essence of performing unit roots test is to check whether variables are stationary or non-stationary. Given that the data adopted in the study was time series in nature thus ADF test for Unit root test were used. In the case where the variables are non-stationary spurious results would be obtained and thus variables should be stationary. To achieve stationarity the variables had to be differenced until they become stationary. The decision rule under the ADF test is that if the ADF test statistic is less than the 5% critical value then the variable is said to be stationary.

Step 3: Lag Length Criteria

The lag length selection is an important time series analysis concept and thus an optimal lag length should be determined. For the purpose of this study the automatic Akaike Information Criterion (AIC) in Eviews was used to determine the optimal lag length.

Step 4: Cointegration Test

Since the data used in the study was time series then the Cointegration test was adopted to establish the order of integration among the variables. The study adopted both the Engle-Granger Cointegration test and Johansen Cointegration test which indicates the order of Cointegration.

Step 5: Short-run Equilibrium (Error Correction) Model

If the Johansen Cointegration test indicates the existence of Cointegration then this implies that there is converge to equilibrium in the long-run. This convergence indicates that

there is a short-run model that adjusts to the long-run model. The adjustment term is the lagged residual which indicates the degree of adjustment to the long-run equilibrium. As asserted by Engle and Granger if the lagged residual is stationary at level then there exists a short-run equilibrium model.

CHAPTER FOUR

FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the descriptive statistics, trends, pre-estimation as well as the post estimation tests and finally discusses the results of the multiple regression model

4.2 Descriptive statistics

The descriptive statistics of Portfolio Risk, interest rates, foreign exchange rates and gross domestic product are presented in the Table 2 below. Portfolio risk had a mean of 23.97 with maximum and minimum values of 321.13 and 2.016 respectively. The mean value of portfolio risk deviated from its mean by 49.5449.

The Interest rate as well had an average of 14.75725 with a maximum of 20.21333 and a minimum 12.2033. The standard deviation from the mean for interest rate was 2.20. Foreign exchange rate had an average value of 78.01474 with a maximum value of 97.29 and a minimum value of 62.64 and its standard deviation was 7.554437. GDP had a mean of 4.12 which deviated over the study period by 2.25 and the maximum and minimum values being recorded for this variable being 8.80 and -0.60 respectively.

TABLE 2

Descriptive statistics

	Portfolio Risk	InterestRate	Foreign Exchange	GDP
Mean	23.96818	14.75725	78.01474	4.817500
Median	11.85656	13.93000	78.08082	5.100000
Maximum	321.1372	20.21333	97.29186	8.800000
Minimum	2.016441	12.20333	62.64148	-0.600000
Std. Dev.	49.54490	2.196747	7.554437	2.247493
Observations	40	40	40	40

4.3 Trend Analysis of the variables

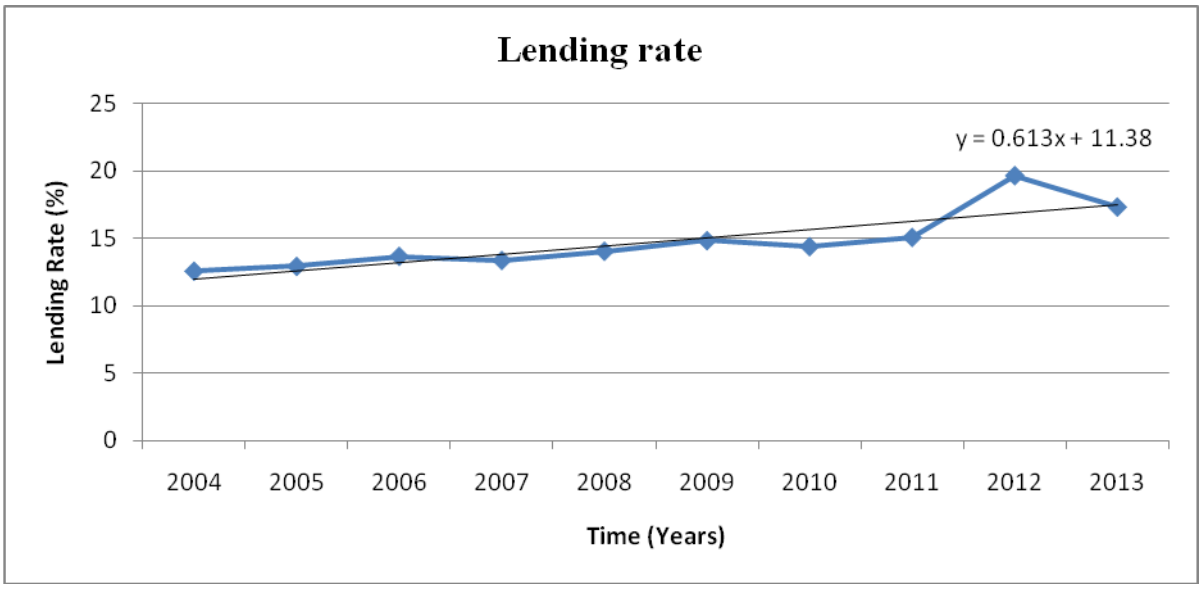
This section provides graphical representation of the movement and changes of the variables under study over the years 2004 to 2013.

4.3.1 Trend Analysis of Lending Rates

The figure 2 below shows the movements of the lending rates for the period 2004 to 2013. The lending rates for this period of time have been generally upward trending. This is evidenced by the linear lending rate plot in the figure. This plot indicates that since 2004 to 2013 there has been an incremental rise in lending rates by 61.4 per cent.

FIGURE 2

Trend of Lending rate against Time

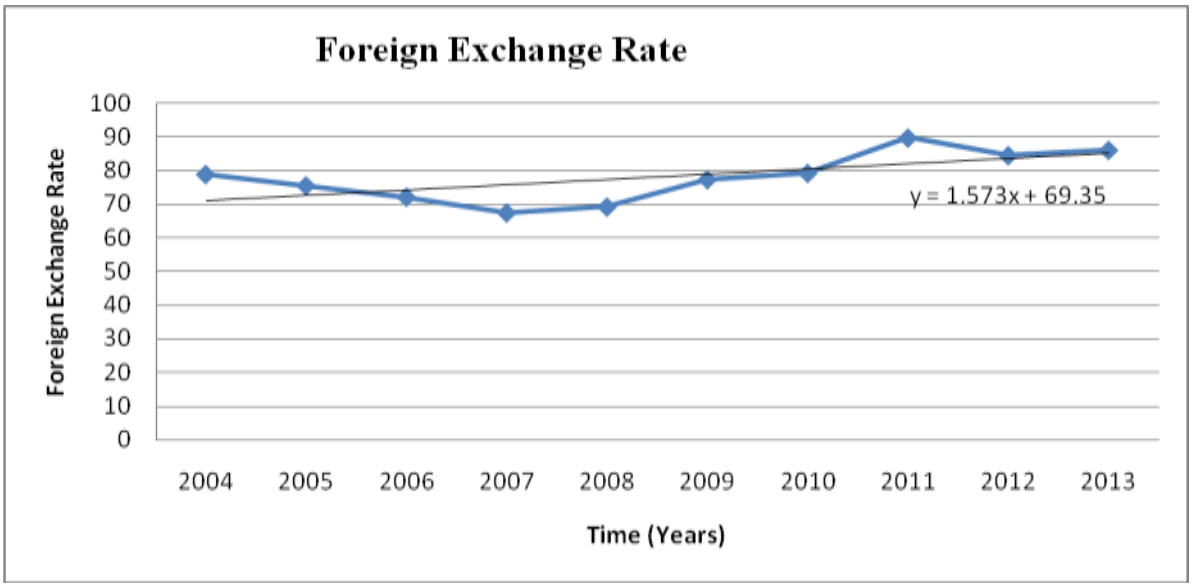


4.3.2 Trend Analysis of Foreign Exchange Rate

The figure 3 in the next page also captures the movement of foreign exchange rates for the 10 year period of study. Despite the irregular movements of foreign exchange rate there has been a consistent upward trend as indicated by the linear plot in the figure.

FIGURE 3

Trends of Foreign Exchange Rate against Time

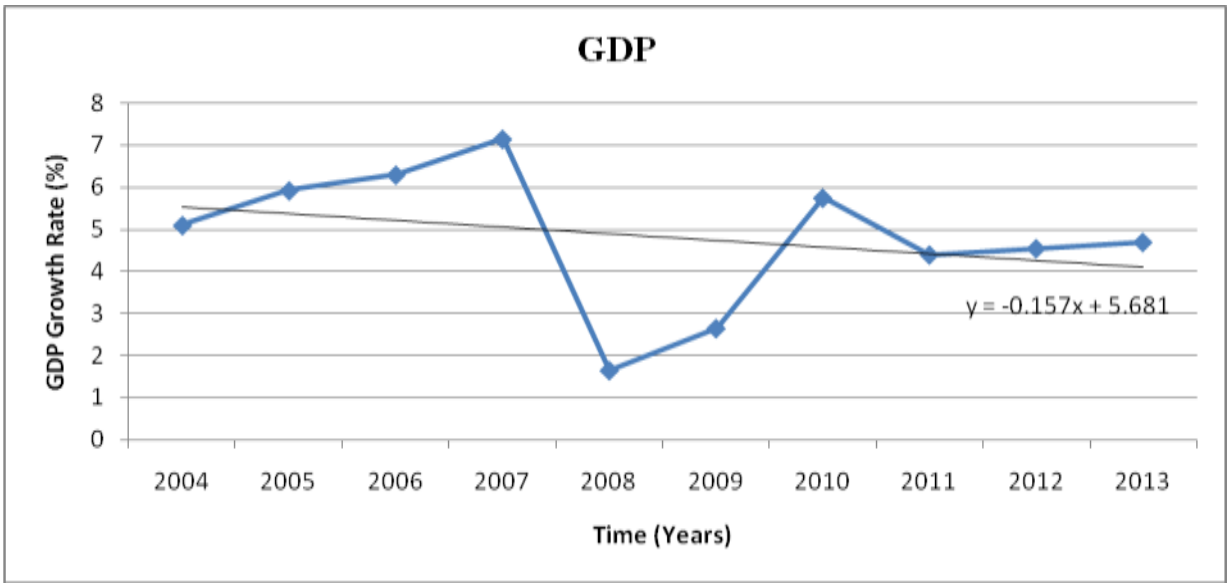


4.3.3 Trend Analysis of GDP at Market Prices

The figure 4 in the next page captures the trend of GDP at market prices for the period 2004 to 2013. From the figure it can be evidently concluded that the GDP at market prices has been cyclical in nature with some periods recording low and others recording high GDP. The period 2007 had the lowest GDP at market prices and this was largely because on the political instability experienced in the country and therefore this translated to poor economic performance of the country. The linear plot clearly indicates that the GDP at market prices has been on the decline by 5.68 per cent since 2004 to 2013.

FIGURE 4

Trend of GDP at Market prices

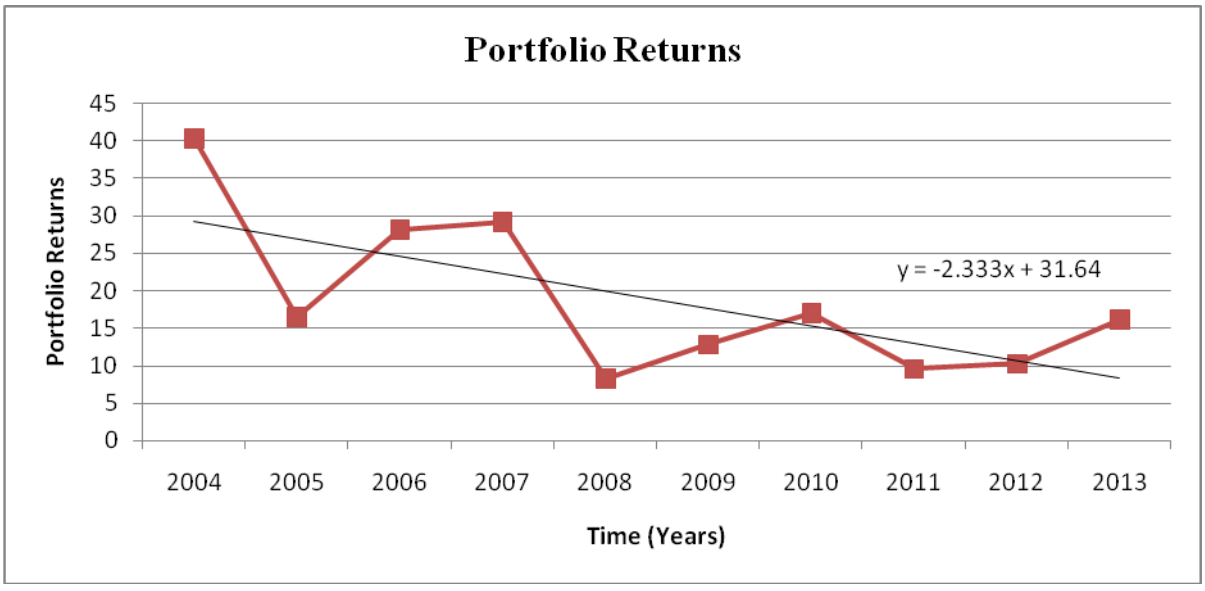


4.3.4 Trend Analysis of Portfolio Risk against Time

The figure 5 below captures the movements in portfolio risk and it indicates that the portfolio risk has been generally declining since 2003 to 2013. The linear line plot shows that the portfolio risk has declined since 2004 to 2013.

FIGURE 5

Trends of Portfolio risk against Time



4.4 Time Series Analysis

Time series analysis includes testing for unit roots, among other tests. If the variables are stationary at level, then the model to be estimated is the long run model, if the variables are non-stationary at level then an error correction model should be run. However, Cointegration must first be run before testing for stationarity.

4.5 Cointegration tests

4.5.1 Engle-Granger Test of Cointegration

The two step Engle granger test was conducted to establish whether there exists Cointegration and results are presented in Table 3. The first procedure is to run the long run equation was run after which the residuals were generated. The residuals were then lagged. The second step was to test for stationary of the residuals using the ADF test. Results indicated that the lagged residuals were stationary at 1%, 5% and 10% levels. This implies that the lagged residuals were stationary and that that there is Cointegration among the long run variables and thus variables converge to long run equilibrium.

TABLE 3

Engle-Granger Cointegration Test

ADF Test statistic		-4.918134	0.0003
p-values	0.01	-3.626784	
	0.05	-2.945842	
	0.10	-2.611531	

A more robust test for Cointegration is the Johnasen test as it indicates the order of Cointegration.

4.5.2 Johnasen Test for Cointegration

While performing the Johansen Cointegration test the study considered the automatic optimal lag length for each variable using Schwarz Information Criterion (SIC). In order to

determine the existence of Cointegration between the variables Rank Test (Trace) statistic was adopted. The null hypothesis for this case is that there is no Cointegration among the variables. The results presented in the tables below fail to reject the null hypothesis of no Cointegration at 5% level of significance for the period under study. The Table 4 indicates that there exist three cointegrating relationships. This implies that there exists a long-run relationship (i.e. Cointegration)

TABLE 4

Johansen Cointegration Test

Series: LNPORTFOLIORISK LNLENDINGRATE LNGDP LNFOREIGNEXCHANGE
Lags interval (in first differences): 1 to 4
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.968403	138.1972	47.85613	0.0000
At most 1 *	0.505590	38.01078	29.79707	0.0045
At most 2 *	0.397152	17.58346	15.49471	0.0239
At most 3	0.095376	2.906854	3.841466	0.0882

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

4.6 Unit Root Tests

Unit root tests were conducted using the ADF test to establish whether the variables were stationary or non-stationary. The purpose of this is to avoid spurious regression results being obtained by using non-stationary series. Results in Table 5 indicated that all variables are non-stationary (i.e. presence of unit roots) as the ADF test statistic is greater than the 5% levels of significance with the exception of Ln Portfolio risk which is stationary. This calls for first differencing of the non-stationary variables.

TABLE 5

Unit root Tests at level

		Critical values			
Variable	ADF Test	1%	5%	10%	Comment
LnPortfolio risk	-4.856357	-4.211868	-3.529738	-3.196411	Stationary
LnGDP	-2.182569	-4.262735	-3.552973	-3.209642	Non-stationary
LnInterest rate	-3.389467	-4.219126	-3.533083	-3.1983212	Non-stationary
LnForex	-2.767789	-4.211808	-3.529758	-3.196411	Non-stationary

Given that the variables LnGDP, LnInterest rate and LnGDP were established to be non-stationary at level (i.e. the ADF test was greater than the 5% critical value). In order to achieve stationarity to be achieved the variables have to be differenced. Table 6 displays the unit root tests after first differencing. It is clear from the results in Table 6 that all the variables become stationary (unit root disappears) on differencing as the ADF test statistic reported is less than the 5% critical value.

TABLE 6

Unit root Tests at First Difference

		Critical values			
Variable	ADF Test	1%	5%	10%	Comment
DLnPortfolio risk	-9.11	-4.22	-3.53	-3.53	Stationary
DLnGDP	-9.12	-4.28	-3.56	-3.22	Stationary
DLnInterest rate	-4.60	-4.22	-3.53	- 3.20	Stationary
DLnForeign Exchange	-5.64	-4.22	-3.53	-3.20	Stationary

4.7 Error Correction Model Results

Since the variables in the model are cointergrated, then an error-correction model can be specified. The error correction model is the model linking the short-run equilibrium model to the long-run equilibrium model. The adjustment/correction term (lagged residuals) is generated from the residuals from the cointegrating regression which is then inserted into the short-run model. The specific lagged residual term is LAGRESIDUAL. The estimates of the error-correction model are given in Table 7.

Results revealed that the short run Interest rate has a negative relationship (β = -3.454677) with short run portfolio risk. This implies that a unitary increase of short run Interest rate leads to a decrease in short run Portfolio risk by 3.45 units.

The adjustment term (lagresid) indicates the rate at which the short-run variations adjust to the long run equilibrium in the dynamic model. The correction term is negative (β =-0.855065) and significant (p-value =0.000). This result implies that there is a negative gradual adjustment (convergence) to the long run stability. The coefficient of (0.855065) indicates that 85.51% of the disequilibria in short run Portfolio riskachieved in one period are corrected in the subsequent period. The other short-run variables however were insignificant.

TABLE 7

Error Correction Model/ Short-Run Model

Dependent Variable: DLNPORTFOLIORISK
Method: Least Squares
Date: 08/08/14 Time: 11:38
Sample (adjusted): 2004Q2 2013Q4
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLNINTERESTRATE	-3.454677	1.485463	-2.325656	0.0265
DLNGDP	0.249441	0.132354	1.884648	0.0686
DLNFOREX	-3.572867	2.013337	-1.774600	0.0855
LAGRESIDUAL	-0.855065	0.164716	-5.191159	0.0000
C	0.042207	0.083177	0.507440	0.6153

R-squared	0.524867	Mean dependent var	0.007403
Adjusted R-squared	0.465475	S.D. dependent var	0.686149
S.E. of regression	0.501652	Akaike info criterion	1.583268
Sum squared resid	8.052947	Schwarz criterion	1.800959
Log likelihood	-24.29045	Hannan-Quinn criter.	1.660014
F-statistic	8.837375	Durbin-Watson stat	1.937998
Prob(F-statistic)	0.000063		

Short-Run Model Equation

DlnPortfoliorisk = 0.042 - 3.45 DlnInterestrate + 0.25 DlnGDP - 3.57DlnForex-0.86 Lagresidual ……..……. Equation III

CHAPTER FIVE

CONCLUSION and RECOMMENDATIONS

5.1 Introduction

A summary of the study's findings, conclusions and recommendations are present in this chapter.

5.2 Summary of Findings

5.2.1 Effect of Interest Rates on Portfolio Risk

The results indicated that the short-run Interest rate has a negative relationship (β = -3.454677) with short run Portfolio Risk. This implies that a unitary increase of short run Interest rate leads to a decrease in short run Portfolio risk by 3.45 units. This finding is consistent with that of Mannasoo (2012) who also found the interest rate was significant especially in Estonia during the financial crisis experienced globally.

5.2.2 Effect of GDP growth rate on Portfolio Risk

The study finds that short-run GDP growth rate (LNGDP) had a positive (β = 2.4944) with Portfolio Risk. The implication of this finding being a unitary increase in short-run GDP, leads to Portfolio Risk increase by 2.4944 units.The findings are consistent of this study as compared with that of Huang, Zhou, and Zhu (2009) who examined the financial instability in Asia and Pacific. Their study found that GDP growth rate was significant. On the other hand short-run GDP rate was positive though insignificant.

5.2.3 Effect of Foreign Exchange Rate on Portfolio Risk

The findings of this study indicates that long-run foreign exchange rate had a negative relationship (β=-0.3966) with the portfolio risk but, this relationship was insignificant (p-value=0.7295)in explaining the variation in the portfolio risks of the financial institutions

stocks listed at the NSE. The short-run foreign exchange rate also had a negative relationship (β=-3.572867) with the portfolio risk but, this relationship was insignificant (p-value=0.0855)This finding seems divergent compared to those presented in the review of literature such as Solnik (2005) who studied the link between exchange rate variation and risk as well as return on foreign investment covering the period 1994 to 2004 concluded that exchange rate variation was the major source of variation in the return on portfolios.

5.3 Conclusions

It was concluded that there was Cointegration among the variables. Results also indicated that in the short run, short-run interest rate and Portfolio Risk was negative and significant. Therefore, an increase in interest rate resulted to a decrease in portfolio risk. Thus, the conclusion that the short-run variations in portfolio risk was due to the variations of the short-run interest rates.

5.4 Recommendations

Based on the study findings discussed above two recommendations are provided based on the objectives of the study. First given that the relationship between interest ratesand portfolio risk was negative and significant it is recommended that despite the fact that an increase in interest rateis associated with a decline in the portfolio risk a policy aimed at reducing the portfolio risk faced by investors should consider among other things such as inflation rates as an increase in the interest ratewith the intention to reduce the portfolio risk by investors may end up discouraging investors from investing in these portfolios.

Secondly, given the significant positive relationship between GDP growth and Portfolio Risk, it is recommended that in making decisions of whether to invest in portfolio stocks listed at the NSE investors should consider the economy's overall performance as proxied by the GDP growth rate. Despite the fact that the relationship was positive for the

period of study, the dynamic nature of the stock market should also be consider so as to ensure that sound investment decisions are made.

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APPENDICES

APPENDIX I

List of Banks

1. Barclays Bank
2. CFC Stanbic Holdings Limited
3. I&M Holdings Limited
4. DTBLtd
5. Housing Finance of Kenya Company Ltd
6. KCB Ltd
7. NBK Ltd
8. NIC Bank Ltd
9. StandardChart Bank
10. Equity Bank ltd
11. The Cooperative Bank of Kenya Ltd

APPENDIX II

Data Set

Year	PORTFOLIO Risk	GDP	FOREIGN EXCHANGE RATE	INTEREST RATE
2004, Q1	20.90360606	7.213554091	78.59456273	12.78526121
2004, Q2	55.70206672	5.835531001	77.48285057	11.349292
2004, Q3	69.60908138	4.244136221	76.7991184	10.86448504
2004, Q4	14.75789328	5.521368399	80.34134589	11.90817547
2005, Q1	26.0310000	2.170895995	76.37827981	12.20880534
2005, Q2	9.8300000	7.467811604	76.35006217	13.01625119
2005, Q3	18.360000	8.446966879	75.32843767	12.92071083
2005, Q4	11.927000	5.930246609	73.80711201	12.97967119
2006, Q1	30.13140011	6.251971002	71.65813212	12.66403866
2006, Q2	26.87882874	6.403182431	71.80462757	13.21242343
2006, Q3	31.4679581	8.672019371	72.65109755	13.00397417
2006, Q4	24.09683911	5.561452587	70.68188809	13.41139655
2007, Q1	36.0034708	8.040052062	69.05715263	12.93993058
2007, Q2	25.69040671	9.185356101	67.03521767	12.7695252
2007, Q3	33.51695535	7.20275433	66.51696911	12.39632756
2007, Q4	21.05342699	5.915801405	65.24333132	12.89559813
2008, Q1	9.11823722	-0.463226442	67.76624023	13.71096859
2008, Q2	6.432319275	2.296484789	62.54499367	13.86468695
2008, Q3	8.632062149	3.329480932	68.39041438	13.56735876
2008, Q4	8.856742841	1.932851143	77.48266955	14.26286514
2009, Q1	22.66024494	5.939903674	79.26963442	14.32012843
2009, Q2	12.31110204	1.084666531	78.25168921	14.63711129
2009, Q3	6.08147387	0.591222108	76.1653482	14.64170386
2009, Q4	10.22969543	3.753445431	74.97836568	14.59207276
2010, Q1	16.96248691	1.654437304	76.25523095	14.58075026
2010, Q2	32.45132216	6.586769832	78.40437694	13.82764022
2010, Q3	8.664590147	7.329968852	80.82618961	13.9767082
2010, Q4	9.850953766	8.447764306	80.42932007	13.69298092
2011, Q1	5.999264089	5.089988961	82.21946729	13.83668138
2011, Q2	10.28035762	3.554205364	86.04308316	13.69772618
2011, Q3	8.398875381	4.125983131	93.15860194	14.24868916
2011, Q4	13.65972787	5.404895918	97.08696599	17.64680544
2012, Q1	11.40201059	3.971030159	83.94802297	19.82529312
2012, Q2	14.33907336	4.7150861	83.95710078	19.92655187
2012, Q3	9.661967406	4.844929511	84.11755231	19.81009399
2012, Q4	5.633339937	5.284500099	85.45974276	18.21066653

2013, Q1	33.95860532	5.70937908	86.232216	17.22082789
2013, Q2	13.09254983	4.796388247	84.39660853	17.168149
2013, Q3	9.249887506	5.038748313	87.10417323	16.76166892
2013, Q4	8.398875381	4.225983131	85.76326769	16.79202249

APPENDIX III

Time Schedule for Dissertation

ACTIVITY/ DURATION	March	April	May	June	July	August	September	October
Research topic and orientation								
Concept paper and research objectives								
Writing and developing proposal								
Defense for proposal								
Data collection								
Data analysis and report writing								
Defense for dissertation								
Final dissertation presentation								