

**MORTGAGE RISK AND MARKET RETURNS OF PUBLIC  
MORTGAGE ORIGINATORS LISTED AT NAIROBI  
SECURITIES EXCHANGE; KENYA**

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**Mortgage Risk and Market Returns of Public Mortgage Originators  
Listed at Nairobi Securities Exchange; Kenya**

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**A Thesis Submitted in Partial Fulfillment of the Requirements for the  
Degree of Doctor of Philosophy in Finance of the Jomo Kenyatta  
University of Agriculture and Technology**

**2022**

## DECLARATION

This thesis is my original work and has not been presented for a degree in any other University

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## **DEDICATION**

I dedicate this thesis to my wife, daughter, father, mother, sister, brother, and aunt. It is because of your unending support and encouragement that I have made it this far.

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## ACRONYMS AND ABBREVIATIONS

<b>ADF</b>	Augmented Dickey Fuller
<b>ANOVA</b>	Analysis of Variance
<b>ASEAN</b>	Association of Southeast Asian Nations
<b>AVG</b>	Average
<b>CAHF</b>	Centre for Affordable Housing in Africa
<b>CAPM</b>	Capital Asset Pricing Model
<b>CBK</b>	Central Bank of Kenya
<b>CHI2</b>	Chi-Square Test
<b>CMA</b>	Capital Markets Authority
<b>COEF.</b>	Coefficient
<b>CONF.</b>	Confidence
<b>CONS.</b>	Constant
<b>CoV</b>	Coefficient of Variation
<b>DF</b>	Degrees of Freedom
<b>EMH</b>	Efficient Market Hypothesis
<b>EPS</b>	Earnings per Share
<b>ERR.</b>	Error
<b>EU</b>	European Union
<b>FEM</b>	Fixed Effects Model
<b>GARCH</b>	Generalized Auto Regressive Conditional Heteroskedastic
<b>GCC</b>	Gulf Cooperation Council

<b>GDP</b>	Gross Domestic Product
<b>GLS</b>	Generalized Least Squares
<b>HFCK</b>	Housing Finance Company of Kenya
<b>KCB</b>	Kenya Commercial Bank
<b>KMRC</b>	Kenya Mortgage Refinancing Company
<b>KNBS</b>	Kenya National Bureau of Statistics
<b>KSH</b>	Kenyan Shillings
<b>MAX</b>	Maximum
<b>MIN</b>	Minimum
<b>MPT</b>	Modern Portfolio Theory
<b>N</b>	Number of Observations
<b>NSE</b>	Nairobi Securities Exchange
<b>OBS.</b>	Observations
<b>PP</b>	Phillip-Perron
<b>PROB.</b>	Probability
<b>REITS</b>	Real Estate Investment Trusts
<b>REM</b>	Random Effect Model
<b>ROA</b>	Return on Assets
<b>ROE</b>	Return on Equity
<b>ROI</b>	Return on Investment
<b>R-SQ</b>	R-Square
<b>R-SQUARE</b>	Coefficient of Determination

<b>S&amp;L</b>	Savings and Loans
<b>SA</b>	South Africa
<b>SACCOs</b>	Savings and Credit Co-operatives
<b>SD</b>	Standard Deviation
<b>SIG.</b>	Significance
<b>SPSS</b>	Statistical Package for Social Science
<b>STD.</b>	Standard
<b>UK</b>	United Kingdom
<b>US</b>	United States
<b>VIF</b>	Variance Inflation Factor
<b>Z</b>	Standard Normal Distribution

## DEFINITION OF TERMS

- Default Risk** This refers to the likelihood that a borrower will not be able to meet their payment obligations when they fall due (Apostolik & Donohue, 2015). Default risk is also referred to as credit risk. Mortgage originators whose borrowers default face the following risks: loss of the principal, interest, and higher collection costs.
- Fallout Risk** This refers to the risk that a potential mortgage borrower fails or withdraws from completing their loan mortgage transaction (Kolb & Overdahl, 2010). Taff (2003) defines fallout risk as the possibility that a potential mortgage borrower does not close on their approved loan application.
- Firm Market Return** This refers to the relative change in value of securities over time (Coleman, 2008). According to Knight and Bertoneche (2000), firm market return can be measured in terms of dividends or stock market prices. In this case, firm market return was measured using stock market prices.
- Firm Market Risk** This refers to risks which affect all institutions within an economy (Bierman & Smidt, 2003). Market risk is also referred to as systematic risk. Market risk cannot be diversified away due to the fact that it affects all firms in the economy (Akenga *et al.*, 2015).
- Mismatch Risk** This refers to the uncertainty of income as a consequence of difference in maturity periods of liabilities, assets, and off-balance

sheet instruments (Cornyn, Cornyn & Mays, 1997). According to Li and Zhang (2017), maturity mismatch describes disparities between fund sources and funds use which could result in default and liquidity challenges.

**Mortgage**

This is a form of debt instrument where the collateral or security is real property - liens against property (Long, 2011). According to Long (2011), the mortgagor (borrower) is required to repay the principal and interest payments in predetermined set of payments prepared by the mortgagee (lender).

**Mortgage Origination** This refers to the process of initial mortgage lending (Shiller, 2012). It can also be referred to as the process of new mortgage creation which involves marketing mortgage products to customers, qualifying the mortgage applicants, processing of the mortgage, and placement of mortgage on originator's books (Shiller, 2012).

**Mortgage Origination Risk:** is the possibility that a mortgage originator will lose out as a consequence of the borrower or potential borrower failing on his obligations of taking up the loan following successful credit appraisal or on the servicing the loan for originators who do not operate in the secondary market (Cusatis & Thomas, 2005).

**Mortgage Risk**

This is the likelihood or risk that a mortgage borrower will fails to meet their obligations – interest and principal – when they fall due

(Barth, 2009). In addition, it encompasses the risk from the origination stage to the when the mortgage is fully settled by the mortgagor.

**Price Risk**

This refers to the possibility of value decline of a portfolio or security (Cusatis & Thomas, 2005). With reference to the mortgage industry, price risk is possibility of the adverse effect in the value of the mortgage commitment as a consequence of changes in mortgage rates (Shiller, 2012).

**Public Mortgage Originators** This refers to all the mortgage originating banks which are listed at the Nairobi Securities Exchange. According to the NSE (2017), there are a total of eleven listed public mortgage originators at the NSE.

## ABSTRACT

Since the year 2010, there have been fluctuations with reference to the market returns of publicly listed mortgage originators in Kenya. This is despite the fact that Kenya's mortgage market is underdeveloped and therefore has the potential and opportunity for growth. Kenya's mortgage debt to GDP ratio is low when compared to other developing countries like South Africa and Namibia. Despite this challenge, existing literature is inconclusive with reference to the relationship between mortgage risk and market returns of publicly listed mortgage originators in Kenya. It is for this reason that the overall objective of this study was to determine the effect of mortgage risk on market returns of public mortgage originators in Kenya. The specific objectives of this study were to determine the effect of residential mortgage fallout risk, mismatch risk, default risk, price risk on market returns of Kenyan publicly listed mortgage originators; and to find out the moderating effect of firm market risk on the effect of mortgage risk on market returns of Kenyan public mortgage originators. The theoretical model of the study was based on six theories namely modern portfolio theory, the loanable funds theory of interest, title and lien theory, liquidity preference theory, efficient market hypothesis, and the random walk theory. The six theories postulated risk mitigation measures that can be utilized by mortgage originators to positively enhance their market returns. Descriptive research design was used. The study furthermore utilized quantitative research approach. A census of all the 11 publicly listed mortgage originators in Kenya was utilized. The study sourced for secondary data from the following sources: Central Bank of Kenya (CBK), Nairobi Securities Exchange (NSE), and financial statements of the 11 publicly listed mortgage originators. Annual secondary data was sourced from the year 2009 to 2019, the study period. A panel data regression model was used to determine the relationship between the study's independent and dependent variables. In addition, descriptive and inferential statistics were utilized to draw inference from the data collected. The study made use of the following descriptive statistical tools: mean, standard deviation, skewness and kurtosis. For inferential statistics, the following measures were utilized: correlation coefficient, z-tests, chi-square tests, and R square statistic. The findings revealed that residential mortgage fallout risk has a positive effect on the market returns of publicly listed mortgage originators. In addition, residential mortgage mismatch risk had a positive influence on the market return rate for publicly listed mortgage originators. Findings further revealed that residential mortgage default risk has a negative effect on the market returns of public mortgage originators. In addition, residential mortgage price risk has a significant negative effect on the market returns of public mortgage originators. The findings further revealed that firm market risk had a significant moderating effect on the effect of mortgage risk on the market returns of publicly listed mortgage originators in Kenya. It is recommended that mortgage originators: source for cheaper sources of long-term capital funds in order to mitigate mismatch risk; develop effective strategies of reducing their non-performing loans; use derivative instruments and competitive interest rates in order to hedge against fluctuations in interest rates. The limitation of the study was that it only focused on public mortgage originators as its study population. However, there are other firms which originate mortgages which were not included in the study sample.

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1. Background of the Study**

This section explores the theoretical, empirical, conceptual, and contextual literature relating to the relationship between mortgage risk and market returns of financial institutions. This section is subdivided into the following subsections: overview of mortgages and mortgage origination risk, a global perspective on mortgage risks and market returns, a Kenyan perspective on mortgage risks and market returns, and the mortgage market in Kenya.

#### **1.1.1. Overview of Mortgages and Mortgage Origination Risk**

The real estate sector is critical to economic and social development of any country be it developed or developing (Mouzughi, Bryde & Al-Shaer, 2014). According to Chui and Chau (2005), the performance of the real estate sector is utilized as one of the benchmarks for measuring economic performance. Similarly, Kong *et al.* (2016) argue that one of the factors that has significantly impacted on China's economic growth and development is its investment in the real estate sector. However, real estate development is capital intensive and requires huge initial capital outlay (Ezimuo, Onyejiaka & Emoh, 2014; Zhaohui, 2015). Due to its capital-intensive nature, investors must find ways to fund their ventures. According to Long (2011), undertaking real estate investment can be funded in the following ways: individual savings, group savings and investments, loans from commercial banks, private equity funds, pension funds, bonds, mortgages, property



loans, foreign funds, and Real Estate Investment Trusts (REITS). However, this study focuses on the mortgage industry.

Long (2011) defines a mortgage as a form of debt instrument or obligation where the collateral or security is real property (liens against property). Institutions and individuals use mortgages to acquire real estate property. However, if a borrower is unable to meet his/her monthly obligations, the bank or financial institution offering the mortgage facility can foreclose the property (Long, 2011). According to Muti (2008), there are two forms of mortgages: fixed rate mortgages and adjustable rate mortgages. The interest rate for a fixed rate mortgage is constant and remains the same throughout the entire contract period (Muti, 2008). However, according to Muti (2008), the interest rate for an adjustable rate mortgage changes and fluctuates over the contract duration of the mortgage.

Mortgage origination is the process of initial mortgage lending (Shiller, 2012). Mortgage banking is the activity of originating mortgages. According to Shiller (2012), the mortgage lender is referred to as the mortgage originator. The most common mortgage originators include mortgage bankers, commercial banks, pension funds, and life assurance companies. Mortgage originators have different options on closed mortgage loans (Taff, 2003; Cusatis & Thomas, 2005). They can for instance sell the loans to a third party; they can keep them in their portfolio; they can securitize the mortgage by issuing debt with the mortgage payment as collateral (Cusatis & Thomas, 2005). Despite these options, Kenyan mortgage originators hold the mortgages they sell to borrowers in their portfolio (Mwaniki, 2017). However, various mortgage originators in the Kenyan

market are in talks with the Capital Markets Authority (CMA) and the Nairobi Securities Exchange (NSE) to introduce mortgage-backed securities in Kenya's capital market (Mwaniki, 2017).

Lang and Jagtiani (2010) identify the housing market crisis – particularly in the mortgage market – in the US as the main onset cause of the 2007-2008 global financial crisis. Similarly, Acharya and Richardson (2009) argue that mortgage risk is one of the major factors that significantly contributed to the global financial crisis in 2007. According to Shiller (2012), the 2007 financial crisis in the US can be traced back to the mortgage origination process. This suggests that there are various risks that arise during the mortgage origination process. Similarly, Demyanyk and Hemert (2011) argue that for six consecutive years before the global financial crisis the quality of mortgage loans deteriorated. Demyanyk and Hemert (2011) attribute this to poor vetting mechanisms – poor mortgage origination processes – by mortgage originators.

Mortgage origination risk is the possibility that a mortgage originator will lose out as a consequence of the borrower or potential borrower failing on his obligations of taking up the loan following successful credit appraisal or on the servicing the loan for originators who do not operate in the secondary market (Cusatis & Thomas, 2005). Taff (2003) refers to uncertainty associated with mortgage origination as pipeline risk. Pipeline risk can be classified into: fallout risk and price risk.

Fallout risk refers to the risk that a potential mortgage borrower fails or withdraws from completing their loan mortgage transaction (Kolb & Overdahl, 2010). Taff (2003) defines fallout risk as the possibility that a potential mortgage borrower does not close

on their approved loan application. High fallout risk occurs when the finalization of a mortgage loan application is dependent on another transaction, for instance, sale of another real estate asset (Taff, 2003). Further, fallout risk arises when mortgage lenders give the borrowers a right but not obligation to cancel the agreement. According to Hakim, Rashidian and Rosenblatt (1999), one of the major causes of fallout risk is the volatility of market mortgage interest rates. For instance, decline in mortgage rates makes it economical for a borrower to seek alternative source of finance. According to Taff (2003), other causes of fallout risk may include: an unfavorable property inspection report, and change in borrower circumstances.

Price risk refers to the possibility of value decline of a portfolio or security (Cusatis & Thomas, 2005). With reference to the mortgage industry, price risk is the possibility of adverse effect in the value of the mortgage commitment as a consequence of changes and fluctuations in mortgage rates (Shiller, 2012). Price risk significantly affects fixed rate mortgages. For instance, if the market mortgage rate rises the originator suffers with low rate commitments.

As previously noted, Kenyan mortgage originators hold the mortgages they originate within their portfolios (Mwaniki, 2017). Consequently, they face more risks as compared to mortgage originators who securitize and sell the mortgages they originate. Additional risks include: mismatch risk and default risk. Mismatch risk is defined as the uncertainty of maintaining a gap between maturities of liabilities and assets (Bessis, 2015). Arif and Anees (2012) argue that the major cause of liquidity risk for any financial institution is maturity mismatch between liabilities and assets. This is attributed to the fact that most

banking business assets are funded with deposits which can be called at any time. Maturity mismatch can be measured using the maturity gap and liquidity gap between assets and liabilities (Arif & Anees, 2012). The higher the liquidity gap the higher the liquidity risk. Mismatch risk for mortgage originators arise when mortgage originators fund successful mortgage loan applications with short term deposits (Bessis, 2015; Shiller, 2012).

Default risk is also referred to as credit risk (Apostolik & Donohue, 2015). It is the likelihood that a borrower will not be able to meet their payment obligations when they fall due. According to Apostolik and Donohue (2015), creditors and lenders are exposed to credit risk on every form of credit extension. Mortgage originators whose borrowers default face a number of risks including the possibility of the loss of the principal, interest, and higher collection costs. According to Barth (2009), mortgage risk encompasses the risk from the mortgage origination stage to the when the mortgage is fully settled by the mortgagor. Thus, this study seeks to determine the extent to which mortgage risks – fall out, price, mismatch, and default – influence industry performance (market return) of mortgage portfolios of public mortgage originators in Kenya.

Stock market return refers to the returns that stockholders generate out of securities they hold in the stock market (Johnson, 2014). According to Mbulawa (2015), stock market returns can be in the form of share price appreciation, and dividends or both. Share price appreciation is generated when a stockholder trades in the secondary market (Johnson, 2014). For instance, a stockholder can make profit by buying a stock at a low price and selling it when the price is high. On the other hand, dividends is a form of reward to the

stockholders for taking the risk of investing in a given firm or institution (Johnson, 2014). The amount of dividends given to the shareholders in a company is determined by the directors of a firm.

There are a number of theories that form the basis of mortgage financing and mortgage risks (Mogaka, 2015). For instance, there is the title theory and the lien theory which was propagated by Williamson Evers and Murray Rothbard (Lloyd, 1923). The title theory states that the borrower (mortgagor) transfers title of a property to the lender (mortgagee) – who holds title to the property until the mortgage is paid off – at which time title passes to the borrower (Karp & Klayman, 2003). However, the lien theory states that a borrower holds title to the property. Therefore, it becomes difficult for the lender to foreclose the property because it does not hold the title to the property (Karp & Klayman, 2003). However, despite the applicability of these two theories – title and lien theories – to the mortgage market; mortgage originators in Kenya are still faced with the challenge of non-performing loans which significantly reduces their financial performance and market return subsequently. For instance, Housing Finance Limited reported a figure of Ksh. 5 billion for non-performing loans in the financial year ending 2015 (Wasuna, 2016).

Another theory that forms the theoretical foundation for this study is the Modern Portfolio Theory (MPT) which was propagated by Markowitz (1952). According to the MPT theory, it is possible to develop an efficient frontier of optimal portfolios which give the maximum likely anticipated return for a given risk level (Francis & Kim, 2013). MPT assumes that all investors are risk-averse which implies that given two portfolios,

investors will prefer the one which has a lower risk. Investors will only choose a portfolio which has a higher risk if the compensation or return on investment (ROI) is higher (Francis & Kim, 2013). Investors can reduce portfolio risk by holding a basket of securities that are not positively correlated. MPT further stipulates that systematic risk cannot be reduced through a portfolio (Elton, Gruber, Brown & Goetzmann, 2009). However, unsystematic or diversifiable risk can be reduced significantly via portfolio diversification. This study seeks to determine the applicability of MPT by mortgage originators in Kenya.

Theoretical literature is inconclusive with reference to the relationship between mortgage risk and industry performance of mortgage originators. For instance, based on the theoretical foundation of the title theory, non-performing loans should have an insignificant effect on industry performance of mortgage originators. This is attributed to the fact that mortgage loans are guaranteed by collateral. However, mortgage firms in Kenya are still significantly affected by a high rate of non-performing loans. In addition, despite the applicability of the MPT; mortgage originators are significantly affected by risk factors which can be diversified away especially the mortgage origination risks.

### **1.1.2. A Global Perspective on Mortgage Risks and Market Returns**

Mortgage markets are differentiated with reference to a number of factors including mortgage products on offer, market penetration degrees, government regulations, capital markets, and economies in general. US mortgage markets for instance differ significantly from EU due to a number of factors including the growth of securitization in the US (Coles & Hardt, 2000). This has consequently resulted in a decline in the need

for US mortgage lenders holding funds – capital adequacy. On the contrary, EU mortgage firm assets are funded via the issuance of mortgage bonds (Coles & Hardt, 2000). According to Coles and Hardt (2000), securitization by mortgage firms in the US has resulted in benefits including risk management, higher liquidity, and the efficient use of capital.

According to Doling (2014), movement of factors of production across different markets has resulted in direct and indirect influencing of mortgage markets across different markets. For instance, the global 2007-2008 financial crisis originated from the US sub-prime lending impacted significantly on mortgage and housing markets across Europe (Doling, 2014). Dirnhofer and Mosk (2012) reveal that US banks which engaged highly in securitization performed exceptionally poor during the 2007-2008 global financial crises. Similarly, Lang and Jagtiani (2010) identify default risk as one of the major causes of the 2007 US subprime mortgage crisis.

According to the Centre for Affordable Housing in Africa (CAHF), majority of African economies have been growing considerably (CAHF, 2013). Despite this, 48.5% of persons living in Sub-Saharan African earn less than one dollar a day. Consequently, majority of the citizenry in Sub Saharan countries lack access to financial services to facilitate home ownership. Namibia and South Africa (SA) are described as the mortgage market leading countries in Sub Saharan Africa (CAHF, 2013). This is attributed to the fact that their mortgage to GDP ratios are above 17%. Omarjee (2018) argues that SA's mortgage market is more developed as compared to other emerging markets due to its sufficiently capitalized banking sector and its sophisticated domestic

financial market. By 2018, SA's mortgage to GDP ratio stood at 20%. However, Omarjee (2018) points out that SA mortgage sector is yet to fully expand due to slow growth of middle class income group, and diminishing levels of entrepreneurship.

Mortgage firms in Sub Saharan Africa rely on customer deposits to fund their mortgage portfolios (Beck *et al.*, 2011). Lack of long term finance is described as one of the major challenges facing mortgage firms in Sub Saharan Africa. Siyan *et al.* (2019) identify maturity mismatch risks as one of the constraints hindering the growth of Nigeria's mortgage sector – Nigeria's mortgage loan to GDP is 0.58%. In addition, mismatch risk is identified as one of the constraints hindering the growth of Nigeria's mortgage sector. In an effort to overcome the challenge of maturity mismatch risk, a number of African countries have instituted institutions geared towards provision of long term funds to mortgage firms (CAHF, 2013). For instance, Tanzania in the 2010 established the Tanzania Mortgage Refinance Corporation. Other challenges which constrain the growth of Africa's mortgage market include high default risk, legal restrictions and constraints, lack of competition, high transaction costs, and interest fluctuations (CAHF, 2013).

In the same vein, Chiquier *et al.* (2004) attribute potential growth of mortgage markets in emerging economies to growth of middle income group, population growth, and rapid urbanization. However, mortgage firms in emerging markets are susceptible to risks including interest rate risk, liquidity risk and credit risk. Chiquier *et al.* (2004) recommends need for a robust change legal and regulatory framework, liberalization of financial sector, and development of mortgage securities.



From an empirical perspective, a number of studies have been carried out across the globe to determine the influence of various diversifiable risk factors in general and mortgage origination risk in particular on the financial and industry performance of financial institutions. For instance, in India, Bandyopadhyay and Saha (2009) carried out a study which sought to determine the factors influencing default risk in residential house loans. The study obtained data from 13,487 house loan accounts from various Indian Housing Finance Institutions. The findings revealed that housing loan defaults significantly influence the financial performance of lenders and thus affects industry performance of financial institutions.

Similarly, Lang and Jagtiani (2010) identify default risk as one of the major causes of the 2007 US subprime mortgage crisis. The study further identifies principal-agent problems as the main cause of failure to apply risk management principles which consequently resulted in the development of the crisis. However, similar studies give contradictory findings. For instance, Kithinji (2010) conducted a study in Kenya which focused on the influence of credit risk management on bank profitability. Study findings revealed that there is no significant relationship between the level of non-performing loans and bank profitability.

In the same vein, Nick (2016) argues that changes in interest rates influence the earnings for financial institutions. Consequently, stock prices are affected by interest rate volatility. Similarly, Mbulawa (2015) carried out a study in Zimbabwe which studied times series data from the year 1980 to 2008. The findings of the study revealed that there is a relationship between stock market performance and interest rates.

In Ghana, Coleman (2008) studied the influence of macroeconomic factors on stock market performance. The findings revealed that the inflation rate, exchange rate and interest rate significantly influence stock market performance. Oyedele (2017) argues that a rise in interest rates will negatively affect stock market performance. For financial institutions, a rise in interest rate will result in better performance (Oyedele, 2017). However, companies will incur a higher cost of borrowing which will thereby reduce firm performance. Empirical literature also conveys contradictory findings. For instance, Avallone (2017) notes that current world stock prices are rising despite global instability, stock market correction, and rising interest rates. This suggests that the relationship between interest rates and stock market performance may not be definite as outlined in empirical literature.

In Pakistan, Arif and Anees (2012) carried out a study which sought to determine the effect of liquidity risk on the profitability of banks. The study derived its data from the financial statements of 22 Pakistani banks. The multiple regression results revealed that bank profitability is significantly influenced by liquidity risk consequently affecting market performance. Arif and Anees (2012) cite non-performing assets and liquidity gap as the two factors which determine the extent of liquidity risk. On the contrary, Bordeleau and Graham (2010) argue that this relationship – liquidity and bank profitability – changes at a certain point where too much liquidity can negatively influence bank profitability and market performance.

From the findings, empirical literature is inconclusive with reference to the relationship between the mortgage risk and firm market returns. In addition, empirical literature

focuses only all financial institutions. However, it does not focus on the relationship between mortgage risk and the market returns of public listed mortgage originators. Consequently, a gap exists in empirical literature.

### **1.1.3. A Kenyan Perspective on Mortgage Risks and Market Returns**

From the Kenyan perspective, extant literature is still inconclusive with respect to how mortgage risk affects market returns. However, literature explores various financial risks in relation to the performance of both financial institutions and the building industry. For instance, Kioko (2014) conducted a study which sought to determine the performance of the real estate market and how it is influenced by mortgage financing. The study sourced data from 392 respondents who had mortgage accounts. According to Kioko (2014), one of the major causes of losses for mortgage originators is high client default rate. Despite numerous strategies of managing default risk – risk based pricing, credit reference rating, credit insurance, and diversification – mortgage originators still have a high number defaulters. For instance, Housing Finance reported a figure of Ksh. 5 billion for non-performing loans in the financial year ending 2015 (Wasuna, 2016).

Muriithi *et al.* (2016) argue that if credit risk is not adequately managed, it may have adverse effects on firm profitability. Kioko (2014) further adds that credit risk significantly influences the level of performance within financial institutions. In order to manage credit risk, lenders can employ various strategies: First, lenders can carry out credit checks before lending to borrowers. Secondly, lenders can ask for security. Thirdly, lenders can insure funds lent out. Fourthly, lenders can ask borrowers to provide guarantors. Finally, securitization. However, despite all these strategies of managing

credit risk; mortgage lenders still face the challenge of credit risk. Juma (2016) notes that the slow growth of Kenya's real estate sector has resulted in a significant increase in non-performing loans in financial institutions.

Maaka (2013) carried out a study which sought to establish the relationship between financial performance and liquidity risk. The study adopted a correlation research design. The study collected secondary data from 33 banks for the period between 2008 and 2013. The study adopted a multiple regression model to draw inference from the data collected. The findings revealed that there is a negative relationship financial institution profitability and increase in liquidity gap. According to Otieno, Nyagol and Onditi (2016), financial institutions need to adopt proper liquidity risk management practices in order to increase or improve their financial performance.

Similarly, Muriithi, Muturi and Waweru (2016) conducted a study which sought to determine the extent to which market risk influences the profitability of banks. The study examined the following as market risk variables: foreign exchange exposure, interest rate risk and financial leverage. The study sourced secondary data from the financial statements of the banks and the CBK. Panel data regression model was utilized to draw inference from the data collected. The findings of study revealed that the three variables had significant negative effect on the profitability of commercial banks. Muriithi *et al.* (2016) recommends the use of derivative instruments in the management of foreign currency risk and interest rate risk.

Juma and Atheru (2018) carried out a study which sought to determine the extent to which financial risks influence commercial bank performance. The financial risks

variables were: foreign exchange risk, interest rate risks, default risk, and liquidity risk. Explanatory research design was utilized. The study collected data from the 42 banks operating in Kenya. A panel data model was utilized to draw inference from the data collected. The findings revealed a significant positive relationship between return on assets and liquidity risk. In addition, findings revealed a negative significant relationship between return on assets and credit risk. Juma and Atheru (2018) argue that there is a positive significant relationship between return on assets and interest rate. In addition, there is a negative significant relationship between return on assets and foreign exchange rate.

Musiega, Olweny, Mukanzi and Mutua (2017) conducted a study whose overall objective was to evaluate the influence credit risk on the bank performance. Credit risk was measured in terms of: loan to deposits ratio, non-performing loans ratio, and capital adequacy. Data for the study was collected from 44 banks operating in Kenya. Panel data was utilized draw inference from the data collected. Findings revealed a negative relationship between bank performance and credit risk. Study findings further revealed that capital adequacy ratio and loans to total deposits ratio does not have a significant effect on return on assets. Musiega *et al.* (2017) recommend banks to adopt effective credit risk management policies.

#### **1.1.4. Mortgage in Kenya**

According to the Kenya National Bureau of Statistics (2019), Kenya's population growth rate as at 2019 stood at 2.3 percent. This implies that Kenya's population grows by approximately 1.1 million every year. As the population grows steadily, the housing

demand within the country also continues to grow in a similar trend. Cytonn (2016) approximates that the real estate sector contributes 9% of Kenya's GDP. According to Mutegi, K'Akumu and Ondieki (2019), the annual housing demand within the Kenyan market stands at 250,000 units. However, the annual housing supply stands at 50,000 units. Consequently, there is an annual housing deficit of 200,000 units (Mutegi *et al.*, 2019). A number of studies by both governmental and non-governmental institutions have explored on the causes and possible solutions to the deal with the housing deficit in Kenya.

The housing deficit crisis in Kenya has presented numerous opportunities for different stakeholders and sectors within the economy (Mutegi *et al.*, 2019). One such sector is the financial sector. This is attributed to the fact that construction is capital intensive in nature and developers may not have adequate resources. Mortgage financing is one of financing options available to developers. The Central Bank of Kenya (CBK) is the institution which is charged with the responsibility of regulating Kenya's mortgage industry (CBK, 2017). The CBK regulates the mortgage finance industry based on the provisions of the Banking Act. There is only one registered mortgage finance company in Kenya – Housing Finance Company of Kenya (HFCK). However, majority of the country's commercial banks have mortgage divisions and wings.

According to the World Bank (2011), 35 out of the 44 commercial banks in Kenya by the year 2010 had a mortgage arm. According to CBK bank supervision report 2018, 33 banks in Kenya were offering mortgage products in the year 2018 (CBK, 2018). In addition, 76.1 percent of mortgage lending in the year 2018 was done by six banks (five

large peer banks and one medium sized bank). Juma (2012) identifies KCB's mortgage arm Savings and Loans (S&L) as the mortgage firm which has the largest market share of 40.8 percent in Kenya's mortgage industry. Housing Finance (HFCK) is identified as the second firm with the largest market share of Kenya's mortgage industry. HFCK's market share stood at 35 percent as at the year 2013. This study focuses on the 11 publicly listed commercial banks which originate and hold mortgage portfolios.

The World Bank and the CBK carried out a Baseline Survey in 2010 whose findings revealed that Kenya's mortgage market had tripled from Ksh. 19 billion in 2006 to Ksh. 61 billion in 2010 (World Bank, 2011). Similarly, Mogaka (2015) argues that as at December 2012 Kenya's mortgage market had a potential of being Ksh 800 billion. However, mortgage loans as at December 2012 stood at Ksh 61 billion. According to CBK Bank Supervision Report 2018, there were 26,504 mortgage loan accounts in the year 2018 as compared to 26,187 in the year 2017 (CBK, 2018). This represented an increase of 1.2 percent. In addition, the value of the mortgage loans increased by 0.76 percent to Ksh. 224.9 billion in 2018 from Ksh. 223.2 billion in the year 2017. Consequently, Kenya's mortgage sector and mortgage market can be described as one which is steadily growing and developing.

According to the CBK Bank Supervision Report 2018, the main features scrutinized by financial institutions before offering residential mortgages to individuals and institutions are value and nature of security, borrower repayment ability, borrower terms of employment, property caveats, location of property, borrower credit history (CBK, 2018). The CBK bank supervision report 2018 further identified the factors hindering the

development of the mortgage market as challenges of property registration, high incidental and property costs, stringent land laws, income levels, and default risk. In addition, interest capping adversely affected the growth of Kenya's mortgage industry. With the adoption of the interest capping law, banks reduced their lending to risky borrowers and preferred investing in government securities which were more guaranteed as compared to mortgage financing (CBK, 2018).

According to World Bank (2011), Kenya's mortgage industry is still undersized given that Kenya's mortgage debt to GDP ratio between 2006 and 2010 was approximately 2.5 percent. This when compared to other developing economies – like South Africa which has a mortgage debt to GDP ratio of 32.5 percent – mortgage uptake is still relatively low. According to Muiruri (2019), Kenya's mortgage to GDP ratio stood at 2.7 percent for the year 2017. There were approximately 20,000 mortgage accounts in Kenya despite Kenya's population of approximately 40 million (Mwaniki, 2013). Muiruri (2019) argues that Kenyans perceive mortgages to be expensive as a result of variable interests. For this reason, they prefer to alternative sources of finance for funding home ownership. An alternative source of finance which is deemed to be affordable for home ownership or building is Savings and Credit Co-operatives (SACCOs) (Muiruri, 2019). Mortgage funding is crucial for the developments of mortgage markets. According to World Bank (2011), one of the main challenges experienced by financial institutions offering mortgage products in Kenya is maturity mismatch brought about by long-term lending. In an effort to grow Kenya's mortgage market and further increase housing supply, the Government of Kenya incorporated the Kenya Mortgage Refinance



Company (KMRC) in conjunction with other institutional stakeholders. KMRC was established to provide affordable long-term and secure funding to mortgage originating firms. According to Mbabazi (2020), financial institutions will borrow funds from KMRC at an annual interest of 5 percent. This will enable the financial institutions to lend at a rate of 7 percent which is below average mortgage market rates (Irungu, 2020). According to Irungu (2020), Kenyans earning Ksh. 150,000 and below will qualify for mortgages from SACCOs and local banks. By so doing, mortgage lenders can offer more favorable interest rates to borrowers which will in turn increase the mortgage products and industry in Kenya.

## **1.2. Statement of the Problem**

Stock market return is the reward or compensation stock investors receive for the risks they incur when investing in ordinary stock (Mbulawa, 2015). In addition, stock market returns can be in the form of: capital appreciation, dividends, or both. Reddy and Narayan (2016) argue that apart from investors benefiting from market returns; market returns play a significant role within institutional and organizational set ups. In the same vein, Natarajan, Sivakavitha and Vasani (2020) argue that market returns have a significant influence on both institutional financial performance and business operations. Reddy and Narayan (2016) and Natarajan *et al.* (2020) reveal that market returns influence the market capitalization of an institution which can consequently influence merger and acquisition decisions, capital structure decisions, and company image. This implies that decline in institutional stock market returns can have adverse effects on both the stock investors and the organization itself. According to Reddy and Narayan (2016),

systematic and unsystematic risk factors can negatively influence the stock market return of an organization.

From the year 2010, the market returns for mortgage originating banks in Kenya has been fluctuating. For instance, Omondi (2016) conducted a study in 2015 whose findings revealed that six of the eleven listed mortgage originating banks at the NSE had experienced a decline in their earnings per share (EPS). The study attributed this to a restrictive macroeconomic environment and a surge in non-performing loans. Similarly, Ngugi (2018) argues that the mortgage originating banks listed at the NSE experienced a decline of one percent in EPS in the year 2017. Ngugi (2018) attributed this to interest rate capping. It is therefore necessary to conduct a study which seeks to understand the inconsistency in market returns of mortgage originating financial institutions in Kenya.

Existing theories provide contradictory explanations as to how mortgage risk affect market returns of market originators. For instance, credit risk by mortgage originators can be significantly managed through the application of the title theory. However, mortgage originators default risk cannot be significantly reduced through the application of the lien theory. In addition, credit risk can be reduced significantly through mortgage securitization. Price risk can also be adequately managed using derivative instruments. By applying MPT, mortgage originators can reduce mortgage risk and thereby enhance their profitability and market returns. Mortgage originators can also enhance their profitability through the applicability of the liquidity preference theory and the loanable funds theory – sourcing for funds in markets which offer competitive interest rates – in managing mismatch risk and fall out risk. Despite the applicability of these theories,

industry performance of mortgage originators is still adversely affected by mortgage risk. For instance, CBK reported Ksh 38.1 billion in non-performing mortgage loans in the financial year ending 2018 (CBK, 2018). Similarly, Njiraini and Anyanzwa (2018) identify increase real estate loan defaulting and mortgage defaults as one of the main contributors to high non-performing within commercial banks in Kenya.

Empirical literature is similarly inconclusive with reference to the applicability of these theories in managing mortgage risk within Kenya's mortgage industry. This presents a gap in empirical literature. For instance, Wu, Li and Hong (2017) carried out a study whose findings revealed that default risk significantly influences the financial performance of financial institutions. However, a study by Kithinji (2010) revealed that there was no significant relationship between the level of non-performing loans and bank profitability. Similarly, Baptiste, Apendi and Wenfu (2017) and Bordeleau and Graham (2010) also give conflicting findings on the relationship between liquidity risk and financial performance of financial institutions. In the same light, Karthigeyan and Mariappan (2017) carried out a study in India whose findings revealed that interest rates significantly influence bank financial performance. However, Ayub and Masih (2013) carried out a study whose findings revealed that there is no significant relationship between interest rates and Islamic bank stock prices.

Contextually, there has been significant growth and improved performance of the real estate sector in Kenya. Some of the key stakeholders in Kenya's real estate sector are the mortgage originators. According to the CBK Bank Supervision Annual Report 2017, there are 11 publicly listed mortgage originators in Kenya. Despite the market presence

of these originators and the rapid growth of the real estate industry, Kenya's mortgage industry is still underdeveloped. Kenya's mortgage debt to GDP ratio was approximately 2.5% between the year 2006 and 2010 which was still relatively low when compared to other developing countries like South Africa (32.5%), Namibia (19.6%), Colombia (7.0%), and India (6.0%) (World Bank, 2011; Arvanitis, 2013). In recent times, Odhiambo (2017) indicates that by the year 2017 Kenya's mortgage to GDP ratio was 4%. When this is compared to South Africa where the mortgage market contributes approximately 30% to the country's GDP. Consequently, Kenya's mortgage market can be characterized as underdeveloped.

Empirical literature including Agao (2014), Akenga *et al.* (2015), Chui and Chau (2005), Juma (2012), and Kalui and Kenyanya (2015) reveal that there are various unsystematic and origination risk factors which hamper the growth of the mortgage industry. These unsystematic risks factors consequently affect the profitability, ROI and therefore market returns of the mortgage originators. Studies – Mayer, Pence and Sherlund (2009), and Kipyegon and Matanda (2019) – reveal maturity mismatch risk and default risk as some of the major risks which mortgage originators in across the globe in general and Kenya in particular face. In addition, studies have focused on factors that influence mortgage uptake in Kenya. Similarly, others studies like Agao (2014) and Kalui and Kenyanya (2015) have focused on how macroeconomic factors influence the growth of the mortgage industry. Empirical literature including Kamweru and Ngui (2017) and Mburu (2014) has also focused on the influence of industry-specific risks on the performance of

the mortgage industry. However, empirical literature is inconclusive on the influence of mortgage risk on market returns of public listed mortgage originators in Kenya.

### **1.3. Research Objectives**

The objectives are identified as both general and specific objectives.

#### **1.3.1. General Objective**

The overall objective of the study was to determine the effect of mortgage risk on market returns of public mortgage originators listed at the NSE in Kenya.

#### **1.3.2. Specific Objectives**

The specific objectives of the study were:

1. To determine the effect of residential mortgage fallout risk on market returns of publicly listed mortgage originators in Kenya.
2. To establish the effect of residential mortgage mismatch risk on market returns of publicly listed mortgage originators in Kenya.
3. To find out the effect of residential mortgage default risk on market returns of publicly listed mortgage originators in Kenya.
4. To ascertain the effect of residential mortgage price risk on market returns of publicly listed mortgage originators in Kenya.
5. To find out the moderating effect of mortgage originator firm market risk on the effect of mortgage risk on market returns of public mortgage originators in Kenya.

#### **1.4. Research Hypotheses**

**H<sub>01</sub>:** Residential mortgage fallout risk has no significant effect on market returns of publicly listed mortgage originators in Kenya.

**H<sub>02</sub>:** Residential mortgage mismatch risk has no significant effect on market returns of publicly listed mortgage originators in Kenya.

**H<sub>03</sub>:** Residential mortgage default risk has no significant effect on market returns of publicly listed mortgage originators in Kenya.

**H<sub>04</sub>:** Residential mortgage price risk has no significant effect on market returns of publicly listed mortgage originators in Kenya.

**H<sub>05</sub>:** There is no significant moderating effect of mortgage originator firm market risk on the effect of mortgage risk on market returns of publicly listed mortgage originators in Kenya.

#### **1.5. Significance of the Study**

##### **1.5.1. Researchers and Scholars**

Kenya's mortgage market is underdeveloped and thus there is need to determine the extent to which mortgage risk factors influence the market return of Kenya's mortgage originators. Majority of the empirical literature - Njiru and Moronge (2013), Okangá (2015), Akenga, Olang, and Galo (2015), and Mburu (2014) - relates to macroeconomic factors and mortgage uptake. However, studies are inconclusive with reference to the effect of mortgage risk on market returns of public mortgage originators in Kenya. This study sought to fill this gap in empirical literature. As a result, the findings from this research process can be utilized as a source of secondary literature.

### **1.5.2. Theoretical Significance**

The study is likely to reveal the applicability of various risk diversification theories – Modern Portfolio Theory, Title theory, Lien theory, The Loanable Funds Theory of Interest, Efficient Market Hypothesis, The Random Walk Theory, and the Liquidity Preference Theory – within the mortgage industry. For instance, the findings of this study reveal the applicability and effectiveness of the title and lien theory in managing default risk by mortgage firms in Kenya. Similarly, the findings of this study reveals the applicability and effectiveness of MPT theory in minimizing mortgage risk by mortgage firms through risk diversification measures. Through the findings of from the loanable funds theory and the liquidity preference theory, mortgage originating firms are likely develop measures of mitigating against price risk and liquidity risk. In addition, the efficient market hypothesis and the random walk theory will likely enable mortgage originating firms comprehend the relationship between mortgage risk factors – fallout, mismatch, default, and price risks – and their influence on firm market returns. Consequently, theoretical modeling relating to mortgage financing can be enhanced and developed through the findings of this study.

### **1.5.3. Empirical Significance**

The study is likely to be of significance to empirical literature both at a local and global context. This is attributed to the fact that there is a gap in empirical gap relating to the effect of mortgage risk factors – fallout risk, default risk, price risk and mismatch risk – on the market returns of public mortgage originators. In addition, the moderating effect

of firm market risk on the influence of these factors was also assessed. The findings of this study are likely to be useful in filling this gap.

#### **1.5.4. Mortgage Industry**

The mortgage industry comprises of commercial banks, mortgage firms, mortgage consumers, and regulators. The findings of this study are likely to enable mortgage firms to better manage the mortgage risk they face. Consequently, the market performance of mortgage originators could be increased considerably. Improved performance is likely to enable mortgage firms offer better financial products to their clientele. As a result, the marketability for mortgages will increase considerably. This will likely in turn have a multiplier effect on the country's economy. In addition, the housing deficit in the country will likely reduce significantly.

#### **1.5.5. Regulatory Institutions**

Regulators of the mortgage industry especially the Central Bank of Kenya and the Capital Markets Authority play a critical role in the mortgage industry. The policies these institutions formulate significantly influence the growth of the mortgage industry. The findings of this study are likely enable the regulatory institutions develop informed policies and strategies aimed at enabling mortgage lenders manage risks which are specific to the industry. Consequently, mortgage firms can offer better products which are likely to result in a significant increase in mortgage uptake in Kenya.

#### **1.6. Scope of the Study**

The study sourced data from secondary sources. Data from secondary sources was sourced from reports released by the Nairobi Securities Exchange (NSE), and the Central



Bank of Kenya (CBK). Secondary data from NSE, and CBK was with reference to: the number of residential mortgage accounts in Kenya, share market prices of the public mortgage originators, NSE-20 share index, and quarterly 91-day Treasury bill rate. Secondary data was also be sourced from the financial statements released by the eleven publicly listed mortgage originators in Kenya as indicated in Appendix II. According to the NSE (2017), there are a total of eleven listed public mortgage originators in Kenya. Public listed companies – unlike private companies – are required by the law to publish their financial statements. Consequently, the study utilized publicly listed mortgage originators because of data availability.

Mortgage risk was studied as the study's independent variable. Mortgage risk was measured in terms of: residential mortgage fallout risk, residential mortgage price risk, residential mortgage mismatch risk, and residential mortgage default risk. According to Cusatis and Thomas (2005), mortgage originators have different options on closed mortgage loans. For instance, they can sell the loans to a third party; they can keep them in their portfolio; they can securitize the mortgage by issuing debt with the mortgage payment as collateral (Cusatis & Thomas, 2005). Despite these options, Kenyan mortgage originators hold the mortgages they originate within their portfolios (Mwaniki, 2017). Consequently, they face more risks as compared to mortgage originators who securitize and sell the mortgages they originate to secondary markets. For this reason, the study investigated the risks mortgage originators face from the mortgage origination process till when the mortgage facility is repaid. The dependent variable for the study was market returns for mortgage originators. Uncertainties and fluctuations in the market

returns for publicly listed mortgages necessitated the study to examine the relationship between mortgage risk and market returns.

According to CBK (2011), four large peer banks and one medium sized financial institution control approximately 42.9% and 28.3% respectively of Kenya's mortgage industry. This represents 71% of Kenya's mortgage market which signifies that the mortgage industry in Kenya is significantly controlled by commercial banks. In the same vein, CBK (2018) notes that five large peer banks and one medium sized bank control approximately 76.1% of the mortgage market in Kenya. In addition, all of the commercial banks listed at the NSE offer mortgages as one of their financial products. Consequently, the 11 publicly listed mortgage originating firms presented a suitable target population for the study. The originators provided data with reference to residential mortgage demand and mortgage uptake as well as financial statement information relating to mismatch and default aspects of assets and liabilities.

Secondary data was sourced from the year 2009 to 2019, the study period. The study utilized this period due to the fact that it is long enough to identify significant trends. Similarly, Mwaniki (2017) notes that it is between 2009 and 2017 that the number of banks offering mortgage products has increased tremendously. Furthermore, the number of Kenya's mortgage accounts has increased from approximately 16,000 in 2011 to over 24,000 in 2016. This represents a 50% increase in the number of mortgage uptake in Kenya.

### **1.7. Limitations of the Study**

Financial innovations within the mortgage industry have revolutionized the financial products being offered by mortgage originators in Kenya. For instance, Karanja (2013) identifies that mortgage products can be classified into some of the following categories: First, commercial mortgages and residential mortgages; Secondly, fixed rate mortgages and variable interest rate mortgages. However, this study was limited in that; it only focused on one category of mortgage products - residential mortgages – and its influence on the market returns for mortgage originators. Given the increased product innovations within the mortgage industry it is necessary to investigate the entirety of all mortgage products and how they influence the market returns for mortgage originators within the Kenyan market.

Similarly, the business environment is one which is dynamic and ever changing. Competition and advancements in technology drive institutions to develop new products and services. The financial industry is not an exception; the industry is characterized with new financial innovations every now and then. For instance, Kenya's mortgage industry is expected to change significantly with the government's creation of the Kenya Mortgage Refinancing Company (KMRC). Through KMRC, financial institutions – mortgage firms – can source capital at favorable interest rates. This is likely to significantly influence the level of mismatch risk experienced by mortgage players in Kenya. Given the time scope of these developments within the financial markets, this study does not capture the variations caused by new developments and financial innovations within Kenya's mortgage industry.

The study only focused on banks which are listed at the NSE. However, there are other banks not listed at the NSE which offer residential mortgages as part of their financial products. In addition, there are other financial institutions – like savings and credit co-operatives and pension funds – which are offering mortgages. This study did not explore the extent to which mortgage risk influences the market returns for these financial institutions. Consequently, study findings may not reflect the real entirety scope of Kenya’s mortgage industry. Study findings only reflect a certain proportion of the Kenya’s mortgage industry.

The study adopted a panel data regression model to draw inference from the data collected. Consequently, the findings of the study are limited based on the assumptions and limitations of the panel regression model. For instance, Tabachnick, Fidell and Ullman (2019) argue that least square and r regression may not be resistant to outliers. In addition, there may be presence of other variables which are not included on the model but have a significant influence on the dependent. Another limitation of the study is that the moderator for the study – firm market risk – was measured using the capital asset pricing model (CAPM). One of the assumptions of CAPM model is that the market is perfect. However, Kenya’s capital market – NSE – cannot be characterized as a perfect market. In the same vein, Janata (2016) argues that the CAPM is based on simplifying and unrealistic assumptions. However, numerous studies have utilized and credited CAPM as an efficient measure of determining market risk.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1. Introduction**

The literature review section outlines and analyzes published articles and journals written by accredited scholars and researchers with reference to the effect of mortgage risk on market returns of public listed mortgage originators. The literature review examines the following sections: theoretical framework, conceptual framework, empirical review, critique of literature review, research gap, and summary.

#### **2.2. Theoretical Framework**

This section explores six theories which mortgage originators can adopt as a risk mitigation measure in order to positively enhance their market returns. The six theoretical models are modern portfolio theory, the loanable funds theory of interest, title and lien theory, liquidity preference theory, efficient market hypothesis, and the random walk theory.

##### **2.2.1. Modern Portfolio Theory**

Modern Portfolio Theory (MPT) was propagated by Markowitz (1952). MPT is also referred to as the Mean-Variance Analysis. According to the MPT theory, an investor can come up with an efficient frontier of optimal portfolios which give the maximum likely anticipated return for a given risk level (Francis & Kim, 2013). According to Sofat and Hiro (2016), MPT is based on the following assumptions: First, risk faced by investors is estimated on expected return variability. Secondly, investment decisions are based on expected return and risk. Thirdly, investors will only chose a portfolio which

has a higher risk if the compensation or ROI is higher. Fourthly, investors make rational choices and are risk averse. Fifthly, returns are normally distributed random variables. Six, similar information is available to all investors. Lastly, the market is efficient. Ugirase (2013) argues that the MPT theory is a technique that can be used by investors to identify the best diversification strategy. Furthermore, the theory stipulates that investors should select investments which are not perfectly positively correlated.

In this case, the independent variables – fallout risk, price risk, default risk, and mismatch risk – for the study can be classified as unsystematic risk factors. This implies that they are organizational risk specific. It further implies that these risks can be reduced significantly through the application of the MPT. For instance, default risk can be diversified or significantly reduced through securitization (Demyanyk & Hemert, 2011; Lang & Jagtiani, 2010). Mismatch risk can be diversified significantly by mortgage originators sourcing capital from both equity and debt instruments (Rono & Ntoiti, 2015). In addition, mismatch risk can be significantly managed if the public listed mortgage originators source debt finance from both the local and international market (Burton & Brown, 2009). Similarly, price risk can be diversified when mortgage originators offer a wide range mortgage market products. Furthermore, empirical evidence for instance Cusatis and Thomas (2005) and Kolb and Overdahl (2010) suggests that derivative instruments can be utilized by mortgage originating firms to minimize both price risk and fallout risk.

This study sought to determine the extent to which mortgage originators apply MPT to manage the mortgage risk they face. By effectively managing these risks through the

MPT – fallout risk, price risk, default risk, and mismatch risk – mortgage originators could possibly improve their profitability and subsequently their market returns. According to McDonnell (2008), some of the MPT assumptions are unrealistic which makes the theory limited.

The theory for instance assumes that investors always act in a rational manner which is not always the case. Mumbi and Omagwa (2017) argue that poor loan appraisal procedures have a significant influence on the default rate of commercial banks in Kenya. If mortgage originators were always rational in their loan appraisal procedures, their default rate could reduce significantly. With regards to the assumption of similar information is available to all investors, information asymmetry is rampant in the country's security exchange. According to Mwaniki (2018), there is prevalence of insider trading at the NSE and recommends the need for regulation and legal framework to deal with the vice. This suggests that some investors at the NSE make more returns on their investment because of information asymmetry.

### **2.2.2. The Loanable Funds Theory of Interest**

The loanable funds theory of interest was propagated by Knut Wicksell (Wicksell, 1936). The loanable funds theory of interest asserts that the interest rate is determined by the demand for and supply of loanable funds (Burton & Brown, 2009). According to Burton and Brown (2009), loanable funds constitute all forms credits for instance savings deposits, bonds, and loans. The theory is based on the several assumptions. First, the integration of markets for loanable funds which is furthermore characterized by the

perfect mobility of funds. Second, there is perfect competition. The theory further assumes that interest rate does not interact with other macro variables.

Based on these assumptions, Kenyan mortgage originators can source for cheaper long term finance from the global financial system which offers cheaper interest rates as compared to the local financial system. In addition, the originators can negotiate with global financial institutions for better rates and repayment terms. In this light, Kenyan mortgage would not fund their mortgage facilities with funding from short term deposits. Consequently, originators will reduce mismatch risk significantly and be in better position of offering market oriented products. This will in turn positively influence profitability and market return. For this study, the loanable funds theory of interest was used in analyzing its applicability of managing mismatch risk by mortgage firms in Kenya.

Empirical literature has made use of the loanable funds theory of interest. Akenga, Olang and Galo (2015) for instance carried out a study which used the loanable fund theory of interest as its theoretical framework. Akenga *et al.* (2015) were studying the influence of mortgage market risk on mortgage uptake. These studies cite the assumptions of the loanable funds theory as its limitations. For instance, the theory assumes the perfect mobility of funds as one of its assumptions. However, there are various regulations and restrictions that govern the transfer of funds from one country to another. For this reason, raising of funds from another country may pose a challenge for mortgage originators.



### **2.2.3. Title and Lien Theory**

The title theory was propagated from the lawful interpretation of contracts as developed by Williamson Evers and Murray Rothbard (Lloyd, 1923). The title theory states that the borrower (mortgagor) transfers title of a property to the lender (mortgagee) – who holds title to the property until the mortgage is paid off – at which time title passes to the borrower (Karp & Klayman, 2003). The financier holds title to the property as a collateral and the title is only transferred to the borrower when he/she clears all payments due. However, title of the property remains with the borrower of the mortgage – according to the lien theory. However, the mortgage becomes a lien on the property. In this case, it becomes difficult for the lender or mortgagee to foreclose the property because it does not hold the title to the property (Karp & Klayman, 2003).

The title and lien theory was applicable to this study with reference to determining the relationship between credit risk and the market returns of mortgage origination firms. In Kenya, Karumba and Wafula (2012) argue that collateral plays a critical role in Kenya's credit provision. This suggests that Kenyan financial institutions apply the title theory and not the lien theory. However, despite the applicability of the title theory within Kenya's mortgage market; mortgage lenders are still faced with the challenge of non-performing loans. For instance, Wasuna (2016) note that in the financial year ending 2015 Housing Finance reported a figure of Ksh. 5 billion for non-performing loans. In the same line, CBK reported Ksh 38.1 billion in non-performing mortgage loans in the financial year ending 2018 (CBK, 2018). Karumba and Wafula (2012) argue that financial institutions need to develop other measures of managing default risk. In this

light, application of the title and lien theory by Kenyan mortgage originators is likely to significantly impact on their financial performance and subsequently positively or negatively affect the market returns for investors.

#### **2.2.4. Liquidity Preference Theory**

The liquidity preference theory was first propagated by John Keynes Maynard (Keynes, 1936). The liquidity preference theory suggests that investors expect high interest rates on securities which have long term maturities (Carvalho, 2015). The theory attributes this to the fact that long term securities carry greater risk. According to the Carvalho (2015), short term security instruments have lower interest because investors sacrifice less when compared to long term security instruments. For an investor to sacrifice more liquidity, he/she must be compensated with a higher rate of return. When higher interest rates are offered, individuals tend to prefer holding onto less money in order to obtain a profit (Hull, 2015).

According to Carvalho (2015), there are three motives which influence demand for liquidity. First, the transaction motive whereby individuals prefer holding cash in order to facilitate and enable them transact. Secondly, the precautionary motive where individuals hold cash as a security measure for an unexpected occasion (Carvalho, 2015). Thirdly, the speculative motive where individuals believe that by holding cash they may find attractive investment opportunities in the future.

The repayment period of a mortgage facility is approximately 15 years and above. This implies that the lender will recover their principal plus interest after 15 years. The longer the repayment period for a credit facility the greater the risk due to volatility of micro

and macroeconomic factors. For reason, mortgage lenders charge high interest on the principal of their mortgage facilities due to the risk they've taken. Consequently, the profitability of mortgage originators is guaranteed. However, high interest rates may discourage mortgage uptake.

According to Mwaniki (2017), mortgage originating firms in Kenya hold the mortgages they originate. Consequently, Kenyan mortgage originators are susceptible to higher risks when compared to mortgage firms who securitize and sell the mortgages they originate. Based on the principles outlined in the liquidity preference theory, investors of Kenyan mortgage originating firms should expect higher returns because of investing in firms which deal with long-term maturing assets which have a higher risk.

#### **2.2.5. Efficient Market Hypothesis**

The Efficient Market Hypothesis (EMH) theory was developed by Eugene Fama (Fama, 1970). The theory postulates that stocks trade at their fair value in security markets which makes it impossible for investors to either sell stocks for inflated prices or purchase undervalued stocks (Burton & Shah, 2013). Consequently, the only technique an investor can earn higher returns is through investing in riskier investments. However, there are various reasons which can make the EMH incorrect. For instance, investors view information differently and may therefore have different stock valuations (Elton *et al.*, 2009). Another reason is that stocks take time to reflect new information and thus investors who act on this information first can take advantage of it. Finally, stock prices can be affected by human error or human emotions (Burton & Shah, 2013). In addition, investors can benefit from market anomalies.

According to Elton *et al.* (2009), there are three variants of EMH: strong, semi-strong, and weak. For the strong form of EMH, the hypothesis suggests that share prices reflect both insider information and public information and thus investors cannot expect to earn superior returns (Burton & Shah, 2013). For semi-strong EMH, the hypothesis claims that share prices reflect all publicly information available – for example present financial statements – and therefore investors cannot use the financial statements of a company to forecast future price movements and secure higher returns (Elton *et al.*, 2009). For weak form, EMH propagates that current share prices reflect past information. Consequently investors cannot outperform the market using ‘past’ information. In this case, the assumptions of EMH were utilized in the determination of market returns for mortgage originators in Kenya. The study assumed that the market returns for the originators were fairly priced. This implied that share prices for the 11 publicly listed mortgage originators were not underpriced or overpriced.

#### **2.2.6. Random Walk Theory**

According to Burton and Shah (2013), the random walk theory was proposed by various scholars including Jules Regnault, Louis Bachelier, Paul Cootner, Burton Malkiel, and Maurice Kendall in the late 19<sup>th</sup> century and mid-20<sup>th</sup> century. The theory advocates that changes in the prices of stock or securities are random and independent of each other (Burton & Shah, 2013). It further proposes that trends from past stock price movements cannot be utilized to forecast future prices. The theory assumes that stocks take an unpredictable random path which makes it difficult to predict future stock prices. Consequently, investors cannot outperform the market without assuming additional risk.

The random walk theory further assumes that stock price movement of one institution is independent of share price movement of another security. However, critiques argue that stocks maintain price trends which investors can use to outperform the market. Critiques argue that through study technical and fundamental analysis investors can predict when to make an entry and exit. The random walk theory was utilized by the study for the determination of mortgage originators market returns. Based on the assumptions of the theory, the market returns of public mortgage originators in Kenya are independent of each other. Consequently, the market returns of one mortgage originator does not influence the market returns for another firm.

### **2.3. Conceptual Framework**

According to Abbott and McKinney (2013), a conceptual framework is a visual representation of study variables in a research process. Abbott and McKinney (2013) further note that a conceptual framework comprises of independent, dependent, moderating or intervening variables. The independent variables are the variables which a study seeks to examine in order to determine their effect on a particular subject matter. The independent variables for this study consisted of residential mortgage fallout risk, residential mortgage default risk, residential mortgage price risk, and residential mortgage mismatch risk. A dependent variable is the variable that is being tested through a research process (Francis, 1998). The dependent variable for this study was market returns of publicly listed mortgage originators as indicated by market returns of the mortgage originators using shares prices at the NSE. Abbott and McKinney (2013) define a moderating variable as a variable which can negate, diminish, and strengthen

the relationship between independent and dependent variables. The moderator was firm market risk. The figure 2.1 presents the conceptual framework.

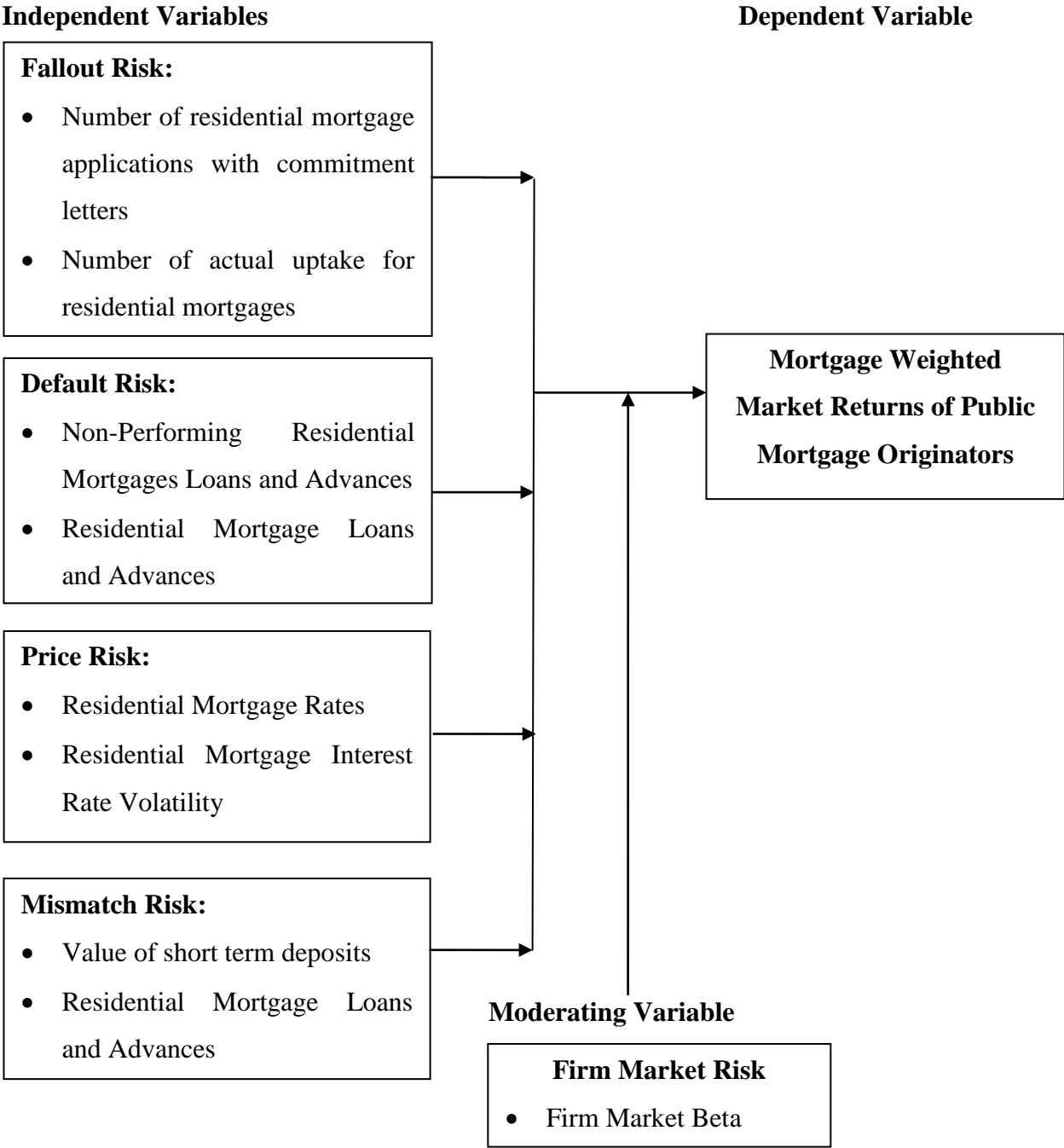


Figure 2.1: Conceptual Framework

### **2.3.1. Fallout Risk**

Fallout risk refers to the risk that a potential mortgage borrower fails or withdraws from completing their loan mortgage transaction (Kolb & Overdahl, 2010). Taff (2003) defines fallout risk as the possibility that a potential mortgage borrower does not close on their approved loan application. According to Taff (2003), fallout risk is a form of mortgage pipeline risk. Changes in interest rates significantly influence the fallout rate for financial institutions (Zabarankin & Uryasev, 2013). For instance, if interest rates decline during the lock-in period, borrowers are likely to source for cheaper sources of funds which offer better rates. Consequently, fluctuations of mortgage rates determine how many mortgages in the pipeline will close. According to Zabarankin and Uryasev (2013), mortgagees can predict their fallout rates based on historical fallout rates and thereby adopt or adjust their hedging strategies for the same. Fallout risk was measured in terms of the number of residential mortgage applicants with commitment letters and the number of actual residential mortgage uptake customers.

### **2.3.2. Default Risk**

Apostolik and Donohue (2015) define credit risk as that risk that accrues to a lender when the borrower fails to make required payments. Default of a credit facility by a borrower results in loss of both principal and interest to the lender (Apostolik & Donohue, 2015). Increase in default or credit risk can have adverse effect on the performance of a financial institution (Ugirase, 2013). For instance, Li and Zou (2014) carried out a study which sought to determine the effect of credit risk management on bank profitability. The study examined 47 of European banks for the period 2007 to

2012. The findings of the study revealed that there is a positive relationship between credit risk management and bank profitability – ROA and ROE. In addition, increase in default risk results in liquidity challenges. In an effort to manage credit risk, financial institutions adopt the following strategies: carrying out credit risk assessment of borrowers, credit insurance, risk-based pricing, and asking for collateral or security for borrowed funds (Apostolik & Donohue, 2015). Default risk – in this case – was measured using the non-performing loans ratio which is the ratio of non-performing residential mortgage loans to total residential mortgage loans and advances.

### **2.3.3. Price Risk**

Cusatis and Thomas (2005) refer to price risk as the possibility of value decline of a portfolio or security. Price risk can be managed through diversification and the application of hedging tools and techniques – for instance derivative instruments. With reference to the mortgage industry, price risk is the possibility of adverse effect in the value of the mortgage commitment as a consequence of changes in mortgage rates (Shiller, 2012). Price risk is considered one of the mortgage pipeline risks and it specifically affects fixed income instruments (Taff, 2003). Price risk was measured by assessing the volatility of residential mortgage rates in the market.

### **2.3.4. Mismatch Risk**

Mismatch risk refers to the uncertainty of income as a consequence of difference in maturity periods of liabilities, assets, and off-balance sheet instruments (Cornyn, Cornyn & Mays, 1997). According to Li and Zhang (2017), maturity mismatch describes disparities between fund sources and funds use which could result in default and



liquidity challenges. Mismatch risk can also be described as the uncertainty that a derivatives dealer is unable to find a viable counterparty to complete a derivatives contract which he/she is acting as an intermediary (Khalik, 2013).

Allen *et al.* (2002) classify maturity mismatch risk into currency mismatch risk and capital structure mismatch risk. Currency mismatch risk refers to risk that arises from disparity in currencies in which liabilities and assets are dominated (Allen *et al.*, 2002). Further, capital structure mismatch risk refers to risk that arises when an institution relies excessively on debt rather than equity financing. According to Allen *et al.* (2002), currency and capital structure mismatch and disparities can significantly and adversely affect the economic performance of a country.

Mismatch risk can also be referred to as asset-liability mismatch. Asset-liability mismatch arises when terms of an organization's liabilities and assets do not tally (Choudhry, 2011). Asset-liability mismatch can be classified into: maturity mismatch, interest rate mismatch, and currency mismatch. According to Choudhry (2011), maturity mismatch relates to a firm having long term assets (for instance fixed rate mortgages) which are funded by short termed liabilities (for instance deposits). Should short term interest rates increase, the short term liabilities become more expensive despite the fact that income from long term assets is constant.

Choudhry (2011) postulates that interest rate mismatch arises when financial institutions borrow at a given interest rate but lend at another. If the borrowing rate is a floating rate while the lending rate is fixed, a rise interest rates will have an adverse effect on bank liquidity. Financial institutions therefore need to adequately manage asset-liability

mismatch in order to avert financial distress (Choudhry, 2011; Cornyn, Cornyn & Mays, 1997). Mismatch risk – in this case – was measured in terms of the value of short-term deposits vis-à-vis the value of residential mortgage loans and advances.

### **2.3.5. Market Return**

Market return refers to the behavior of securities within a capital market (Coleman, 2008). Stock market return refers to the returns that stockholders generate out of securities they hold in the stock market (Johnson, 2014). According to Knight and Bertoneche (2000), firm market return can be measured in terms of dividends or stock market prices. Similarly, Mbulawa (2015) argues stock market returns can be in the form of share price appreciation, and dividends. Share price appreciation is generated when a stockholder trades in the secondary market (Johnson, 2014). For instance, a shareholders can make a profit by buying a stock at a low price and selling it when the price is high. On the other hand, dividends is a form of reward to the stockholders for taking the risk of investing in a given institution (Johnson, 2014). The amount of dividends given to the shareholders in a company is determined by the directors of a firm. In this case, firm market return was measured using stock market prices of mortgage originators.

### **2.3.6. Firm Market Risk**

Market risk refers to risks which affect all institutions within an economy (Bierman & Smidt, 2003). According to Akenga *et al.* (2015), risks can be classified into two major categories: systematic risk and unsystematic risk. Market risk is also referred to as systematic risk. Market risk cannot be diversified away due to the fact that it affects all firms in the economy (Akenga *et al.*, 2015). Examples of systematic risk: inflation,

GDP, interest rate, political instability, and exchange rate fluctuations. On the other hand, Bierman and Smidt (2003) define unsystematic risk as risks which affect only a particular industry within an economy. Bierman (2010), postulates that unsystematic risk can be reduced through diversification in different sectors of the economy. In this case, firm market risk was utilized as the moderator for the study. Firm market risk was thus measured using firm market beta. The firm market beta was calculated using the Capital Asset Pricing Model (CAPM).

## **2.4. Empirical Literature Review**

This section outlines and explores published articles, research studies, and journals written by accredited scholars and researchers with reference to: mismatch risk and performance of financial institutions, default risk and performance of financial institutions, fallout risk and performance of financial institutions, price risk and performance of financial institutions, and market risk and market returns.

### **2.4.1. Mismatch Risk and Performance of Financial Institutions**

According to Li and Zhang (2017), maturity mismatch describes disparities between fund sources and funds use which could result in default and liquidity challenges. In addition, mismatch risk arises when an organization has more short-term liabilities than short term assets or having lower liabilities than assets for long term obligations. Muriithi and Waweru (2017) argue that liquidity mismatch is measured using the liquidity gap which is caused by there being a difference between a bank's liabilities and its assets. In addition, a liquidity gap may either be negative or positive. Maturity

mismatch also arises due recessionary economic conditions. It may also be caused by delays in cashflows from the borrowers.

Babi (2015) conducted a study in Iran which sought to determine the influence of financial risks on the relationship between stock returns and earnings. The study sampled 65 companies listed by the Tehran Stock Exchange. The study utilized secondary from the year 2008 to 2013. Financial risk was measured using solvency credit, and liquidity risk. The findings of the study revealed that liquidity risk had an insignificant effect on the relationship between earnings per share and stock return. This finding suggests that mismatch risk does not influence investor stock return.

Berger and Bouwman (2013) carried out a study which sought to determine the extent to which capital affects bank performance during economic cycles in the United States. Quarterly financial statement reports from every bank in the US became the source of data for the research process. According to Berger and Bouwman (2013), capital plays a critical role in determining the financial performance for small financial institutions during all the stages of the economic cycle. However, for large and medium sized institutions capital enhances bank profitability during times of economic crisis.

In Iran, Ahmadyan and Shahchera (2018) conducted a study whose overall objective was to determine the relationship between liquidity risk and asset and liability management. The study collected data from 30 Iranian banks. The study utilized secondary data from the year 2006 to 2018. A panel data regression model was utilized to draw inference from the data collected. The findings indicated a significant relationship between liquidity risk and asset-liability management. According to Ahmadyan and Shahchera

(2018), liquidity risk reduces significantly when there is effective bank asset-liability management. In addition, increase in capital adequacy significantly reduces the levels of bank liquidity risk.

Shair *et al.* (2019) carried out a study in Pakistan which sought to determine the relationship between bank profitability and financial risk and competition. The study sourced secondary data from the World Bank, Ministry of Finance Pakistan, and financial statements from various banks. The study collected data for the period between the year 2007 and 2017. The findings of the study revealed that competition, insolvency risk, and credit risk had a negative influence on bank profitability. The findings further revealed that there was a negative relationship between bank profitability and liquidity risk.

Pradhan and Khadka (2017) conducted a study in Nepal which sought to determine the influence of debt financing on bank financial profitability. The study sample was 22 banks and data was collected for the period 2008 to 2014. According to Pradhan and Khadka (2017), there is a positive relationship between short term debt to total assets and bank profitability.

Mujahid, Zuberi, Rafiq, Sameen and Shakoor (2014) carried out a study which sought to investigate the relationship between bank performance and capital structure. The study was empirical in nature and focused on banks in Pakistan and other foreign countries. The study measured capital structure in terms of short term debt to capital ratio, long term debt to capital ratio, and total debt to capital ratio. Profitability was measured in terms of return on equity, return on assets, and earnings per share. A multiple regression

model was used to draw inference from the data collected. The findings revealed that there is a positive relationship between capital structure and bank performance.

Similarly, Arif and Anees (2012) sought to determine the influence of liquidity risk on bank performance in Pakistan. The study was secondary-based and data was collected from 22 Pakistan banks. The study utilized a multiple regression model to draw inference from the data collected. The findings revealed that one of the significant factors that increased liquidity risk is liquidity gap. In addition, findings revealed that liquidity risk adversely affect bank performance. According to Arif and Anees (2012), the study was limited since it only utilized data between 2004 and 2009. In addition, the findings of the study could not be generalized since the sample collected was not representative of the population being studied.

Khan and Syed (2013) carried out a study which sought to determine the effect of liquidity risk on bank profitability. A multiple regression model was utilized to draw inference from the data collected. The findings of the study revealed that there is a negative relationship between liquidity gap and bank profitability.

Hassan, Khan and Paltrinier (2019) carried out a study which sought to examine the influence of liquidity risk on bank stability between conventional and Islamic banks. The study period was between 2007 and 2015 and a total of 52 banks operating in Organization of Islamic Cooperation Countries were sampled. From the findings, there was a negative relationship between liquidity risk and credit risk. In addition, there is a negative relationship between bank stability and liquidity risk. This implies that increase in liquidity risk negatively and significantly affects bank stability. However, Hassan *et*

*al.* (2019) study does not reveal the disparity of these relationships which reference to Islamic and conventional banks.

Bourakba and Belouafi (2015) carried out a study in Gulf Cooperation Council (GCC) which sought to determine the effect of maturity mismatch on the performance of Islamic banks and conventional banks. The study collected data from various financial institutions in GCC for the period between 2000 and 2012. Data collected was analyzed quantitatively. The findings revealed that conventional banks were severely affected during the 2007-2008 global financial crisis. Bourakba and Belouafi (2015) attributed this to the fact that conventional banks lend long term with funds short term borrowed. On the contrary, Islamic banks match liabilities with assets. For this reason, Islamic banks were not adversely affected as the conventional banks during the 2007-2008 global financial crisis.

Karthigeyan and Mariappan (2017) conducted a study in India which sought to determine the extent of liquidity management on private banks. The study examined four banks: City Union Bank, Tamil Nadu Mercantile Bank, Karur Vysya Bank, and Lakshmi Vilas Bank. The findings of the study revealed that if a bank does not adequately mitigate risks arising from the mismatch of long-term assets and short term liabilities; the commercial bank stands to face liquidity challenges.

Hassler, Chiquer and Lea (2004) carried out a study in emerging markets on mortgage securities. The study noted that mortgage uptake in emerging economies remained low despite the significant need of real estate investment. According to Hassler *et al.* (2004), liquidity does significantly influence the performance of mortgage lenders. Similarly,

Aysun (2006) studied the extent of maturity mismatches within markets which are emerging. The study sourced for panel data from 214 deposit taking financial institutions based in 18 emerging market countries. The panel data used for the study was selected from the year 1990 to 2004. The findings of study identified the following as the determinants of maturity mismatches within emerging economies: price volatility and capital inflows. The findings further revealed that financial institutions which have low maturity mismatches perform better in terms of profitability during crisis periods. However, in times when there is no crisis; this is not the relationship. This suggests that firms with low maturity mismatches are more stable during times of economic crisis than financial institutions which have high maturity mismatches. However, Aysun (2006) the study was limited since it did not put into consideration the interaction between maturity mismatches and currency mismatches.

Baptiste, Apendi and Wenfu (2017) carried out a study in Congo which sought to investigate the relationship between interest rates and profitability of banks. The study studied seven banks for the period between 2007 and 2014. The findings of the study identified factors which significantly impact on bank profitability as asset size, default risk, and interest rate spread. Baptiste *et al.* (2017) define interest rate spread as the difference between interest earned by financial institutions and interest paid on interest bearing liabilities by financial institutions. Baptiste *et al.* (2017) find interest rate spread had the highest significance on bank and financial institution profitability.

Ojong, Bassey and Awo (2014) carried out a study in Nigeria which sought to examine the influence of liquidity and credit risk management on bank profitability. The First



Bank of Nigeria Plc was utilized as the case study. The study utilized a descriptive form of research design. The study collected primary data from 80 respondents. The Pearson product moment correlation was utilized for data analysis. The findings revealed that there is a significant relationship between bank profitability and bank liquidity. Ojong *et al.* (2014) recommend that banks need to effectively manage the delicate balance between loan-deposits in order to reduce mismatch risk.

Musah, Anokye and Gakpetor (2018) carried out a study in Ghana which sought to determine the relationship between commercial bank profitability and interest rate spread. Bank profitability was measured using ROE and ROA. Net interest margin and net interest income were utilized as the measures for interest rate spread. The study collected its data from 24 banks. Secondary data for a ten year period was collected. A panel data regression model was utilized to draw inference from the data collected. The findings reveal a significant positive relationship between the profitability of banks and interest rate spread. According to Musah *et al.* (2018), these findings are propagated through the loanable funds theory.

Veni and Negash (2019) carried out a study in Ethiopia which sought to determine the relationship between commercial bank profitability and asset-liability management. The study sourced its data from eleven banks for the period between the year 2007 and 2017. A panel data regression model was utilized to draw inference from the data collected. The findings revealed that all bank liabilities with the exception of non-interest bearing loans have a negative impact on bank profitability. In addition, all bank assets with the exception of fixed assets have a positive effect on bank profitability.

In Kenya, Mukanzi, Mukanzi and Maniagi (2016) carried out a study which sought to determine the relationship between stock returns at the NSE and financial risk. The study measured financial risk in terms of: credit risk, liquidity risk and business risk. Liquidity risk was measured using the current and quick ratios. The study collected secondary data from the year 2010 to 2015 from CBK, KNBS, and financial statements. A regression model was utilized to draw inference from the data collected. The findings of the study revealed that there was a positive significant relationship liquidity risk and the stock returns.

Similarly, Kamau and Njeru (2016) studied the influence of liquidity risk on financial performance of various insurance companies in Kenya. The study adopted a descriptive form of research design. The target population for the study was six insurance companies in Kenya. Descriptive statistics was utilized to draw inference from the data collected. The findings of their study revealed that maturity mismatch between cash inflows and outflows can significantly increase an organization's liquidity risk.

In the same vein, Irungu (2013) studied how bank performance is influenced by interest rate spread. Interest rate spread is the difference between interest charged by financial institutions to borrowers and interest paid by financial institutions on borrowings and deposits. The target population for the study were all the 43 commercial banks in Kenya. A regression model was utilized to draw inference from the data collected. The findings revealed that there is a strong positive relationship between the two variables – interest rate spread and financial performance. However, the study is limited since it did not compare these results to an economic scenario where interest recapping was in force.

Another Kenyan study, Mwangi (2014) carried out a study which sought to determine the relationship between liquidity and financial performance. The study derived its data - financial statements – from all the Kenyan deposit taking microfinance institutions. The data utilized ranged from the years 2009 to 2013. A multiple regression model was utilized to draw inference from the data collected. Mwangi (2014) notes that mismatches between liabilities and assets can significantly and positively influence the financial performance of deposit taking microfinance institutions. According to Mwangi (2014), the findings of the study cannot be generalized for the entire financial sector because the study only focused on one of sectors within the financial market in Kenya.

Musembi, Ali and Kingi (2016) carried out a study in Kenya which sought to determine the extent to which bank performance is influenced by liquidity risk. The study measured liquidity risk in terms of liquidity level and capital adequacy. Descriptive research design was utilized. The study sourced its data from both primary and secondary sources. The population of the study consisted of 11 banks listed at the NSE. The findings of the study revealed that capital adequacy had a positive significant effect on the return on assets of commercial banks. In addition, liquidity level had a positive insignificant effect on bank return on assets. Musembi *et al.* (2016) recommend that banks should increase their core capital levels because it influences their profitability. In addition, banks should efficiently manage their liquidity gap.

Mudanya and Muturi (2018) conducted a study in Kenya which examined the relationship between bank financial performance and financial risk. The study examined the following as the financial risk variables: credit risk, liquidity risk, and operational

risk. Quantitative research design was utilized. The study sourced its data from eleven commercial banks listed at the NSE. The secondary data study period was from the year 2007 to 2016. Panel data analysis was carried out to draw inference from the data collected. The findings revealed that increase in liquidity risk, credit risk, and operational risk would result in a significant decrease in bank profitability. According to Mudanya and Muturi (2018), banks need to adequately manage these financial risks – credit risk, liquidity risk, and operational risk – because they significantly impact on their financial performance.

Ng’etich and Wanjau (2011) conducted a study which sought to examine the extent to which interest rate spread influences the level of non-performing assets in banks. Descriptive research design was utilized. The study sourced its data from 43 commercial banks operating in Kenya. Data was analyzed qualitatively and quantitatively. The findings of the study reveal that bank non-performing assets are significantly influenced by interest rate spread. Ng’etich and Wanjau (2011) attribute this to the fact that volatility of interest rate spread will result in increase in the cost of borrowed loans. In addition, regulations of interest rates impact on the levels of non-performing loans in the banking sector. Ng’etich and Wanjau (2011) recommend that financial institutions develop effective policies on interest rates because it will in turn affect the level of their non-performing loans and consequently profitability.

Were and Wambua (2014) carried out a study which sought to identify the factors which influence interest rate spread by commercial banks in Kenya. Exploratory research design was utilized. The study collected secondary the period between the year 2002 and

2011. The study utilized panel data analysis to draw inference from the data collected. Study findings identified the following as the factors which positively influence interest rate spread: operational costs, return on assets, credit risk, and bank size. On the contrary, high bank liquidity ratio has a negative on bank interest rate spread. According to Were and Wambua (2014), small banks have lower spreads when compared to big banks. In addition, macroeconomic factors like economic had an insignificant effect on spread.

Similarly, Rono and Ntoiti (2015) carried out a study which sought to determine the effect of capital structure on the financial performance of various financial institutions in Kenya. The study utilized Kenya Commercial Bank as its case study. The study utilized secondary data from the year 2009 to 2013. Panel data regression analysis was utilized to draw inference from the data collected. According to Rono and Ntoiti (2015), study findings revealed that leverage and capital structure does significantly influence the financial performance of financial institutions. The findings revealed a negative relationship between financial performance and non-performing loans.

Juma and Atheru (2018) carried out a study which sought to determine the extent to which financial risks influence commercial bank performance. The financial risks variables were: foreign exchange risk, interest rate risks, default risk, and liquidity risk. Explanatory research design was utilized. The study collected data from the 42 banks operating in Kenya. A panel data model was utilized to draw inference from the data collected. The findings revealed a significant positive relationship between return on assets and liquidity risk. In addition, findings revealed a negative significant relationship

between return on assets and credit risk. Juma and Atheru (2018) argue that there is a positive significant relationship between return on assets and interest rate. In addition, there is a negative significant relationship between return on assets and foreign exchange rate.

#### **2.4.2. Default Risk and Performance of Financial Institutions**

Chava and Purnanandam (2010) argue that investors expect high returns as compensation for bearing default risk. However, Chava and Purnanandam (2010) argue that although there is a positive relationship between default risk and stock returns; returns are usually lower than the expected returns. In the same vein, Khan *et al.* (2018) conducted a study in Pakistan which sought to determine the relationship between financial risk and market return. The study utilized the Pakistan stock exchange as its case study. Financial risk was measured with reference to liquidity risk and credit risk. The study collected secondary data for the period between the year 2010 and 2015. The study sampled a total of 50 companies. The findings of the study revealed a significant negative relationship between credit risk and stock return. On the contrary, the findings revealed that there was a significant positive relationship between liquidity risk and stock return.

Similarly, Gharghori, Chan and Faff (2009) carried out a study in Australia which sought to examine the relationship between equity returns and default risk. The study utilized Fama and MacBeth regression framework. The findings revealed a negative relationship between default risk and equity returns. In the same vein, Christoph and Ralf (2009) carried out a comparative study in the US and German which sought to determine the

relationship between default risk and equity. The findings from their study reveal that firms with high default risk experience lower returns in both the US and Germany.

Dirnhofer and Mosk (2012) carried out a study which sought to examine the relationship between bank performance and mortgage backed securities. The study sampled the top 375 banks in the USA. The findings of their study revealed that US banks which engaged highly in securitization performed exceptionally poor during the 2007-2008 global financial crisis. According to Dirnhofer and Mosk (2012), default risk is significantly managed when mortgage firms securitize and sell mortgage backed securities. However, the risk of default is passed on to whoever investments in the mortgage backed securities.

Bhattarai (2016) carried out a study in Nepal which sought to determine the influence of credit risk on the financial performance of commercial banks. The study adopted a descriptive and causal comparative form of research design. The study sampled Nepalese banks for the period between 2010 and 2015. The study used the regression model to analyze the financial statements from 14 banks. The findings revealed that non-performing loan ratio has a negative influence of the financial performance of banks.

Similarly, Davis and Zhu (2009) conducted a study that sought to determine the relationship between commercial property prices and bank performance. The study sourced its data from various banks in industrialized economies. The findings revealed that there is a positive relationship between these two variables. However, study findings revealed that there was a negative relationship between commercial property price and bad loan ratios and net interest margin.

Isanzu (2017) conducted a study on China's five largest banks for a period between 2008 and 2014. The study sought to determine the influence of default risk on bank financial performance. Credit risk was measured using: loan impaired charges, impaired loan reserve, capital adequacy ratio, and nonperforming loans. The study utilized a balanced panel data regression model to draw inference from the data collected. The findings revealed that non-performing loans significantly impact of bank financial performance.

Mayer, Pence and Sherlund (2009) conducted a study which sought to identify the factors that cause a rise in rates of mortgage defaults. The study identified the causes of rise in mortgage default as poor underwriting standards, decline in property prices, and rise in loan-to-value ratios. Mayer *et al.* (2009) argue that poor underwriting standards are the major cause of rise in mortgage default rate. Consequently, they argue that when mortgage firms implement proper underwriting standards mortgage default rates should decline significantly.

Similarly, Wu, Li and Hong (2017) conducted a study which sought to determine causes of defaults among home mortgages. The study identified the following as the factors which cause default among home mortgage borrowers: terms of lending contract, characteristics of the borrowers, and macroeconomic factors. Wu *et al.* (2017) argue that mortgage lenders need to adopt effective credit risk management techniques in order to effectively manage their default rate which can adversely affect their profitability.

Rehman *et al.* (2019) conducted a study which sought to determine the strategies Balochistan commercial banks utilize to manage credit risk. The study utilized explanatory form of research design. The study collected primary data from 250



employees working in various commercial banks. A multiple regression model was utilized to draw inference from the data collected. Findings from the study revealed the following as the credit risk management strategies adopted by commercial banks in Balochistan: capital adequacy ratio, hedging, diversification, and corporate governance.

Ariffin and Tafri (2014) carried out a study which sought to examine the relationship between Islamic bank profitability and financial risks. The study collected secondary data from annual financial reports of 65 Islamic banks worldwide. The data was for the period between the year 2004 and 2011. Panel data analysis was utilized to draw inference from the data collected. The findings of the study revealed that default risk has a significant negative effect on the profitability of Islamic banks. Ariffin and Tafri (2014) argue that interest rate fluctuations have a significant influence on default rate and subsequently bank profitability. The findings further reveal that interest rate risk and liquidity risk have an insignificant positive effect on bank profitability.

Alshatti (2015) conducted a study to determine the influence of credit risk management on the financial performance of Jordanian banks. The study sourced its data from 13 Jordanian banks. The study sourced for panel data from the financial statement reports 2005-2013 of 13 Jordanian banks. A panel regression model was utilized to draw inference from the data collected. The findings of the study reveal that there is a positive relationship between credit risk indicators of non-performing loans on bank profitability. Alshatti (2015) argues that financial institutions should enhance their credit risk management abilities in order to increase their financial performance.

Canepa and Khaled (2018) conducted a study in a number of countries whose main objective was to identify the relationship between various housing market variables and credit risk. The study identified the determinants of credit risk in housing markets as house or real estate prices, financial liberalization, regulations in the property market, and macroeconomic variables. Canepa and Khaled (2018) argue that decline in property prices has the effect of reducing the quality of banks' assets which in turn affect their lending capacity. In addition, decline in property prices has the effect of lowering the value or quality of securities held by financial institutions in terms of real estate. In addition, financial liberalization of the mortgage industry significantly affects both the credit risk of financial institutions and the housing market (Canepa & Khaled, 2018).

Financial liberalization within the mortgage industry could for instance result in increased competition, new risky opportunities for mortgage firms, and poor vetting mechanisms for clientele (Canepa & Khaled, 2018). Regulations in the real estate market in terms of government policy can have adverse effects on real estate and mortgage financing all of which can result in increase in non-performing loans by financial institutions and mortgage firms. Canepa and Khaled (2018) asserts that expansionary and contractionary business cycles within an economy significantly influence the real estate and mortgage market which in turn affects non-performing loans within financial institutions.

Folajimi and Dare (2020) conducted a study which sought to examine the relationship between bank performance and credit risk in Nigeria. The study adopted a descriptive form of research design. The study population consisted of 19 commercial banks listed

at the stock exchange. The study collected secondary data for the period between the year 2006 and 2018. Financial performance was measured using the return on capital employed. Credit risk was measured in terms of capital adequacy ratio, non-performing loans ratio, and ratio of loan loss provisions to deposits. The findings of the study revealed that loan to deposits ratio, capital adequacy ratio, and non-performing loans have a significant negative impact on the return on capital employed of commercial banks.

Gadzo *et al.* (2019) conducted a study which sought to determine the relationship between financial performance and operational risk and credit risk in Ghana. The study collected data from 24 commercial banks. Findings from the study revealed that credit risk negatively impacts on bank financial performance. Similarly, operational risk negatively influences bank financial performance. Gadzo *et al.* (2019) further argue that liquidity, cost to income ratio, bank leverage, and asset quality have a significant effect on the level of bank credit risk.

Similarly, Ntiamoah *et al.* (2014) carried out a study which sought to determine the influence of default loan rate on financial institution financial performance. The study adopted by a quantitative and qualitative research design. The study sourced its data from various microfinance institutions in the Republic of Ghana. Correlation and regression models were utilized to draw inference from the data collected. Study findings revealed a significant positive correlation between profitability and loan default rate.

In Kenya, Mwaura, Muturi and Waititu (2017) carried out a study which sought to determine the relationship between market return and credit risk. The study utilized correlational descriptive research design. The study examined 9 commercial banks listed at the NSE. The study sourced for secondary data for the period between 2006 and 2015. A generalized least square regression model was utilized to inference from the data collected. The findings revealed a significant negative relationship between non-performing loans ratio and stock returns. Mwaura *et al.* (2017) argue that credit risk significantly influences NSE stock returns.

Similarly, Muriithi, Waweru and Muturi (2016) conducted a study which sought to examine the influence of default risk on the performance of banks. Credit risk was measured by loan loss provision, asset quality, capital to risk weighted assets, and loan and advance ratios. The study derived its data from 43 registered banks. According to Muriithi *et al.* (2016), default risk has a negative effect on bank financial performance. The study recommended that banks should adopt thorough credit analysis and have clearly outlined credit policies in order to manage non-performing loans.

Kauna (2016) carried out a study in Kenya which sought to determine the influence of credit risk management on bank financial performance. The study noted that default risk was one of the major precipitates of financial institution failure. The study obtained financial statements from 39 commercial banks for the period 2011-2015. Data was analyzed using a regression model. Findings revealed a positive relationship between credit risk monitoring and credit risk identification and bank financial performance.

According to Kauna (2016), banks can significantly enhance their financial performance by managing credit risk.

Muguchia (2012) carried out a study which sought to examine the influence of flexible interest rate on the growth of mortgage financing in Kenya. The study collected its data from 26 commercial banks and HFCK. Study findings identified non-performing loans as one of the factors which negatively influenced mortgage financing.

However, various studies contradict these findings. Kithinji (2010) carried out a study in Kenya which sought to determine the influence of credit risk management on the financial performance of Kenyan banks. The study sourced its data from banks for the period ranging 2004 and 2008. A regression model was utilized to draw inference from the data collected. The findings of this study revealed that there was no significant relationship between the level of non-performing loans and bank profitability.

On the contrary, Kipyegon and Matanda (2019) conducted a study in Kenya which sought to determine the relationship between mortgage uptake and volatility of interest rates. The study adopted a descriptive form of research design. The target population for the study was 44 commercial banks. The study utilized both primary and secondary data collection techniques to source for data. The findings revealed that mortgage uptake is significantly influenced by inflation rate, loan demand, and gross domestic product. However, findings revealed that credit risk has insignificant effect on mortgage uptake.

Gathaiya (2017) conducted a study which sought to determine factors which caused the collapse of three banks in Kenya. The study sampled three banks that had collapsed: Chase bank, Imperial bank, and Dubai bank. The study period was the year 2015 to

2016. Diagnostic research design was utilized. Content analysis was utilized to analyze the data collected. Gathaiya (2017) identifies the following as the factors which caused the collapse of the three banks: weak corporate governance structures and practices, substandard risk management techniques, weak supervisory and regulatory systems, insider lending, and conflict of interest. The study recommends empowerment of CBK as the bank regulator. Gathaiya (2017) further recommends proper credit risk assessments for bank employees and bank directors before loan disbursements. This is attributed to the fact they contribute to the significant proportion of non-performing loans within commercial banks.

Wamalwa and Mukanzi (2018) conducted a study which sought to determine the influence of financial risk management on bank financial performance. The study examined the following financial risk management strategies: credit risk management, capital risk management, liquidity risk management, and interest rate risk management. Descriptive research design was utilized. The study population were 9 banks operating in Kakamega County. Panel data analysis was utilized to draw inference from the data collected. The findings revealed that capital risk management and credit risk management had a significant positive influence on bank financial performance. On the contrary, interest risk management and liquidity risk management had an insignificant negative effect on the financial performance of commercial banks. According to Wamalwa and Mukanzi (2018), commercial banks need to adequately manage their financial risks in order to maximize their financial performance.

Bwari and Oluoch (2017) carried out a study which sought to determine the relationship between market performance of firms listed at the NSE and financial risks. The study measured financial risk in terms of: foreign exchange risk, interest rate risk, liquidity risk, and credit risk. Descriptive research design was adopted as the research design for the study. Secondary data from the year 2008 to 2016 was collected. Microsoft Excel and SPSS were the statistical software packages utilized for analyzes. The findings for the data collected revealed that interest rate risk had a significant positive effect on market performance. On the contrary, foreign exchange risk, credit risk, and liquidity had a significant negative effect on market performance of firms listed at the NSE.

#### **2.4.3. Fallout Risk and Performance of Financial Institutions**

Fallout risk refers to the risk that a potential mortgage borrower fails or withdraws from completing their loan mortgage transaction (Kolb & Overdahl, 2010). Taff (2003) defines fallout risk as the possibility that a potential mortgage borrower does not close on their approved loan application. According to Kolb and Overdahl (2010), the factors that can affect a firm's fallout rate include first, the quality of the underlying security. Secondly, change in current interest rates after the initial borrower lock rate. Thirdly, the credit quality of the mortgagee. Similarly, Zhang and Jiaotong (2010) argues that besides interest rate movement, there are other factors which affect the fallout ratio for mortgage originators. Zhang and Jiaotong (2010) identifies these factors as purpose of the loan, loan origination source, and lock type.

According to Taff (2003), it is imperative for financial institutions and mortgage originators to institute strategies of enhancing the pull-through rate. Consequently,

mortgage originators will not incur any costs that are associated with fallout risk. Some of the strategies of enhancing the pull-through rate include introducing information systems that accurately detail loans and which allow relock at lower rates and identify loanable funds with float-down-only features. Taff (2003) also argues that derivatives can be utilized as a strategy of managing fallout risk. In the same vein, Zhang and Jiaotong (2010) argues that there are various capital market instruments which can be utilized in the management of fallout risk.

Andersen, Hager, Maberg, Naess, and Tunland (2012) carried out a study which sought to examine the extent to which operational risk exposure within financial institutions contributed to the 2008 financial crisis. The findings of their Bayesian Network analysis revealed that failure to manage operational risk was one of the major cause of the financial crisis. Chernobai, Jorion and Yu (2011) who conducted a study in the US which sought to determine the causes of operational risk in financial institutions. The study identified lack of efficient internal controls as one of the major cause of operational losses. Chernobai *et al.* (2011) identified high credit risk as a consequence of operational losses. The study recommended managerial incentives and corporate governance as the measures of managing or mitigating operational risk.

In Kenya, Karanja (2013) carried out a study whose overall objective was to determine the effect of mortgage financing on commercial bank financial performance. The study noted that the number of financial institutions – commercial banks – offering mortgages had increased steadily over the last two decades. The study adopted a descriptive form of research design. The target population for the study was the 44 commercial banks in



Kenya. Questionnaires were utilized as the data collection instrument for the study. Descriptive and inferential statistics were the data analysis techniques that were utilized to draw inference from the data collected. The findings revealed that there was a positive relationship between mortgage financing and bank financial performance. The findings further revealed that pipeline risk – fallout and price risk – significantly influence the financial performance of mortgage originators. However, the study does not identify the extent to which each specific mortgage pipeline risk influences the financial performance of mortgage originators.

In Kenya, Nyanyuki and Omar (2016) carried out a study which sought to identify elements which affect mortgage lending by financial institutions. The study sampled 43 banks located in Mombasa County. Questionnaires were utilized as the data collection instruments for the study. Descriptive statistics was utilized to draw inference from the data collected from the respondents. Findings identified mortgage revealed mortgage lending improved bank profitability. In addition, findings revealed that mortgage costs significantly influence mortgage lending thus affect bank profitability. This implies that if mortgage fallout rate increases bank profitability can be adversely affected.

Similarly, Mogaka, Mboya and Kamau (2015) carried out a study which sought to determine the relationship between mortgage market growth in Kenya and macroeconomic factors. Data utilized to determine this relationship was collected from the year 1984 to 2013. The study examined the following as the macroeconomic factors: Treasury bill rate, informal sector employment, exchange rate, GDP growth rate, and inflation rate. Regression analysis was utilized to draw inference from the data collected.

The findings revealed that exchange rate, per capital income, and informal sector employment have a significant relationship on mortgage market growth. Mogaka *et al.* (2015) argue that cost of mortgages significantly impact on an individual's ability to take up a mortgage. Consequently, mortgage fallout rate is significantly influenced by changes in the potential customer variables.

Adongo (2012) carried out a study in Kenya which sought to examine the relationship between the financial performance of banks and mortgage financing. Correlation research design was utilized as the research design for the study. The study made use of secondary data collected from 43 commercial banks operating in Kenya. The data collection period was from the year 2007 to 2011. A multiple regression model was utilized to draw inference from the data collected. Study findings revealed a strong positive relationship between bank financial performance and mortgage financing. According to Adongo (2012), commercial banks in Kenya have ventured into mortgage finance and financing due to the following reasons: mortgage high interest rates, increasing cross-selling potential, increasing market penetration, and competitive strategy. Consequently, mortgage fallout rate has a significance on mortgage uptake which in turn influences the financial performance of mortgage originators.

Similarly, Dondi and Ouma (2017) carried out study in Kenya which sought to determine the relationship between commercial bank financial performance and mortgage lending volumes. Correlation research design was utilized. The study collected secondary data from the year 2006 to 2014. The data was sourced from the NSE and the CBK. The findings of the study revealed that there was a significant negative correlation

between mortgage volume and return on assets, return on equity, and net interest margin. According to Dondi and Ouma (2017), there is a weak significant negative effect between bank financial performance and mortgage lending volume.

Kalui and Kenyanya (2015) conducted a study which sought to determine the factors influencing access to mortgage financing. The study sampled 44 banks in Kenya. The findings revealed the following as the factors that may cause lack of mortgage uptake: income, credit risk, form of mortgage factor, and accessibility to mortgage information. Kalui and Kenyanya (2015) argue that changes in interest rate can result in mortgage fallout.

#### **2.4.4. Price Risk and Performance of Financial Institutions**

Liow and Huang (2006) conducted a study which sought to determine the effect of interest rate volatility on the stock returns of Asian property firms. The study sourced for secondary data from property stock indexes for the period 1987 to 2003. The findings of their study revealed that property stocks are sensitive to short and long-term interest rate changes. Similarly, Tran (2013) carried out a study whose findings revealed that interest rate volatility significantly influences bank stock returns and performance. In particular, long-term interest rates and returns of bank ordinary stocks are correlated positively. In the same vein, Dhanani *et al.* (2008) argues that UK banks invest a substantial proportion of their resources in managing interest rate risk. For instance, derivatives are one of the strategies UK banks use to reduce interest rate risk. By adequately managing interest rate risk, commercial banks are able to ensure shareholder wealth maximization (Dhanani *et al.*, 2008).

Oluwaseyi, Islam, Yusoff and Rahman (2019) carried out a study which sought to determine the influence of interest rate risk and liquidity risk on firm value. The sample for the study comprised of 63 banks in 5 Association of Southeast Asian Nations (ASEAN) countries. Secondary data for the period was collected from the year 2009 to 2017. Study findings revealed that there is a significant positive effect between loan to deposits ratio and firm value. In addition, findings revealed that there is a significant negative effect between interest rate risk and firm value. Oluwaseyi *et al.* (2019) argue that there is a significant negative effect between liquidity risk and return on equity. It is imperative for financial institutions to develop mitigation measures against these risks which significantly impact on their financial performance (Oluwaseyi *et al.*, 2019).

Similarly, Meng and Deng (2013) carried out a study in China which sought to determine the relationship between foreign exchange, interest rate and bank stock returns. The study population comprised of 14 banks listed at Shenzhen and Shanghai stock exchanges. The study adopted a GARCH model to draw inference from the data collected. The findings of the study reveal that there is an insignificant relationship between interest rate fluctuations and stock returns. However, study findings revealed a significant relationship between foreign exchange fluctuations and stock returns.

Amarasinghe (2015) conducted a study which sought to determine the relationship between interest rate and stock price. The case study for the investigation was Colombo Stock Exchange. Secondary data was sourced from the all share price index from the period between the year 2007 and 2013. The study utilized a regression model to draw

inference from the secondary data collected. The findings of the study revealed that there is a negative significant relationship between interest rate and stock price.

Vaz, Ariff and Brooks (2008) carried out a study in Australia which sought to determine the relationship between bank stock returns and interest rate fluctuations. The study collected secondary data from the 1990 to 2005. The study collected secondary data from eleven banks listed at the Australian Stock Exchange. The findings of the study revealed a positive significant relationship between interest rate fluctuations and bank stock returns.

In Turkey, Minny and Gormus (2017) carried out a study which sought to determine the influence of interest rate fluctuations on the profitability of banks. The study selected three major banks in Turkey as its sample. Panel data analysis was utilized to draw inference from the 2008 to 2016 financial statements. Findings revealed that there is a positive relationship between interest rate volatility and the performance of financial institutions. Similarly, Muharrami (2015) carried out a study in Oman whose overall objective was to determine the whether the Oman banking system is fair to entrepreneurs and depositors. The study sourced its data from seven Oman banks for the financial period 2002 to 2012. The findings of the study revealed that volatility of interest rates significantly influences banks' equity, assets, and net income. According to Muharrami (2015), a bank's profit margin declines when interest expenses increase more rapidly than interest revenues.

Muhammad *et al.* (2014) carried out a study in Pakistan which sought to determine the relationship between bank profitability and interest rates. Bank profitability was

measured in terms of return on equity (ROE) and return on assets (ROA). Interest rates were measured using bank lending rates. The study collected its data from both private and public owned banks. A regression model was utilized to draw inference from the data collected. The findings revealed that interest rates fluctuations have a significant effect on bank profitability. According to Muhammad *et al.* (2014), interest rate risk affects private banks more than public banks.

Similarly in Pakistan, Gull and Zaman (2013) investigated the influence of interest rate fluctuation on the performance of banks in Pakistan. The study sampled 20 Pakistan banks for the financial period 2007 to 2011. Regression and correlation models were utilized to draw findings from the data collected. The findings revealed that interest rates significantly influence bank financial performance.

Ahmed *et al.* (2018) conducted a study in Pakistan which sought to determine the influence of fluctuations of interest rates on the financial performance of banks. The study sourced its data from 20 banks with the highest market share operating in Pakistan for the period between 2007 and 2014. Regression and correlation analysis was utilized draw inference from the data collected. The findings for the study revealed that there is a negative relationship between interest rate fluctuations and bank profitability. However, findings revealed a positive relationship between loans and advances and bank profitability. However, the study does not assess the impact of interest rate fluctuations on bank market return.

Ndung'u (2012) also carried out a study in Kenya whose objective was to determine the influence of interest rate volatility on stock returns. The study utilized data from the NSE

and the CBK. The study revealed interest rates do affect stock market performance. For instance, a rise in interest rates will result in people investing more in saving bank accounts rather than the stock market. Thus, Ndung'u (2012) recommends that the monetary policy committee need to be keen with determining the interest because it can adversely affect the performance of the Nairobi Securities Exchange market. However, the study was limited since it only focused on interest rate volatility and did not other factors in its model.

Obegi and Oluoch (2019) carried out a study which sought to determine the relationship between bank financial performance and price risk. In this case, price risk was measured using exchange rate risk, inflation, and interest rate risk. The study sourced secondary data from CBK reports dating 2013 to 2018. A time series regression model was utilized to draw inference from the data collected. The findings of the study revealed that price risk had a significant effect on bank financial performance. According to Obegi and Oluoch (2019), interest rate had a positive none significant effect on bank profitability.

Kigomo (2016) conducted a study which sought to determine the causes of low mortgage uptake in Kenya. The study notes that Kenya's mortgage to GDP is relatively low when compared to other economies. The study adopted a descriptive form of research design. The population for the study was mortgage customers and snowballing sampling technique was utilized to select the sample for the study. Questionnaires were utilized as the data collection instrument for the study. According to Kigomo (2016), the factors which significantly influence mortgage uptake in Kenya include income, interest rates, credit risk, and mortgage costs.

Similarly, Macharia and Wanyoike (2016) conducted a study which sought to determine the factors which influence mortgage uptake in Nakuru. The study collected data from employees working in various financial institutions in Nakuru. Inferential and descriptive statistics were utilized to draw inference from the data collected. The findings collected revealed that mortgage costs significantly influence mortgage uptake. Macharia and Wanyoike (2016) define mortgage costs as the costs and fees which are associated with mortgage acquisition. Examples of mortgage costs include arrangement fees, valuation fees, stamp duty, mortgage interest, and legal fees. In addition, increase or fluctuations in mortgage interest rates results in increase in mortgage costs.

In the same light, Lagat and Okendo (2016) carried out a study in Kenya which sought to determine the influence of interest rate volatility on the financial performance of banks. The study examined the banks listed at the NSE for the financial period 2006 to 2013. A multivariate linear regression model was utilized to draw inference from the secondary data collected. The findings revealed a weak positive relationship between fluctuations of bank interest rate and financial performance. Similarly, Ayub and Masih (2013) carried out a study whose findings revealed that there is no significant relationship between interest rates and Islamic bank stock prices.

Toroitich and Anyango (2017) carried out a study which sought to examine the relationship between stability of interest rates and economic performance in Kenya. Toroitich and Anyango (2017) argue that interest rates are a function of other macroeconomic variables. In addition, interest rate fluctuations are a consequence of interest liberalization – determined by the forces of demand and supply. Bank



performance and operations is significantly influenced by interest rates due to loanable assets and lending rates. The study sourced its data from KNBS for the period between 2005 and 2014. The study analyzed data using SPSS. According to Toroitich and Anyango (2017), credit supply and purchasing power parity significantly affect economic performance.

Abdulrehman and Nyamute (2018) carried out a study in Kenya which sought to find the influence of mortgage finance on bank performance. The study sourced secondary data from all commercial banks. The study utilized regression and correlation analyses to draw inference from the data collected. Findings revealed that there is a positive significant relationship between bank financial performance and interest rate charged. Abdulrehman and Nyamute (2018) recommend that financial institutions should improve their mortgage products in order to enhance and increase their financial performance. This suggests that mortgage interest rates significantly influence bank financial performance.

Kavwele, Ariemba and Evusa (2018) conducted a study which sought to determine the relationship between interest rate capping and bank performance. The study collected secondary data prior to and after Kenya enforced the law on interest capping. Data was analyzed through a multiple linear regression model. The findings of the study revealed a negative relationship between interest rate capping and bank performance. In the same light, Kihara and Mwangi (2017) conducted a study which sought to determine the relationship between interest rates and financial performance of banks. Secondary data was collected from 43 banks in Kenya. The findings revealed that lending interest rates

has a significant positive effect on bank financial performance. On the contrary, deposit interest rate has a negative effect on bank profitability and performance.

Njiru and Moronge (2013) carried out a study which sought to determine the growth of Kenya's mortgage industry. The study adopted a descriptive form of research design. The study identified the following as the most significant factors that influence mortgage industry growth: accessibility to mortgage facilities, and volatility of interest rates. Other factors identified by the study include: government regulations and policies, and default risk. According to Njiru and Moronge (2013), default risk does not significantly influence mortgage uptake when compared to interest rate volatility and accessibility to mortgage facilities. This implies that price risk significantly influences mortgage uptake which in turn affects the growth rate of financial institutions offering mortgage products and facilities.

Mugambi and Okech (2016) conducted a study in Kenya which sought to determine the relationship between bank stock returns and macroeconomic variables. The study examined the following macroeconomic variables: GDP, inflation rate, interest rate, and exchange rate. The study collected secondary data from the year 2000 to 2015. Ordinary Least Squares and linear regression model was used to draw inference from the data collected. The findings of the study revealed that the following macroeconomic variables have a significant effect on the stock returns of banks: inflation, exchange rate, and interest rate. According to Mugambi and Okech (2016), there is a significant negative relationship between bank stock returns and interest rates. This is attributed to the fact

that interest rate fluctuations have a negative effect on bank profitability which subsequently affects bank stock returns.

Similarly, Ngalawa and Ngare (2014) conducted a study whose overall objective was to determine the measures Kenyan banks manage interest rate risk. The study examined 10 commercial banks listed at the Nairobi Securities Exchange for the period between 2008 and 2012. According to Ngalawa and Ngare (2014), the causes of interest rate risk are repricing risk, yield curve risk, basis risk, and optionality risk. The findings of their study revealed that a change of 2% in market interest rates could result in 0.4% change in income of the total assets of the bank.

Macharia (2013) conducted a study which sought to determine the extent to which the financial performance of banks in Kenya offering mortgage financing were influenced by the global financial crisis. The study adopted a descriptive form of research design. The population for the study was 330 managerial employees working for 10 commercial banks. Questionnaires were utilized as the data collection instrument for the study. Quantitative analysis was utilized to draw inference from the data collected. According to Macharia (2013), a unit rise in interest rate results in a financial performance decrease of 0.425 by banks offering mortgage products. Consequently, the study recommends that interest rate fluctuations significantly affect the financial performance of financial institutions.

Owuor, Wainaina and Mwangi (2018) carried out a study which sought to determine the relationship between the growth of the Kenyan mortgage market and macroeconomic factors. The study examined the following macroeconomic factors: GDP, inflation rate,

interest rate, and exchange rate. The study sourced secondary data for the period between 2007 and 2016. Data collected was analyzed using descriptive and inferential statistics. The study findings revealed that there was an insignificant relationship between mortgage market growth and GDP, and exchange rate. However, Owuor *et al.* (2018) determined that there is a significant positive relationship between mortgage market growth and inflation and interest rates.

Jebiwott and Kalui (2019) carried out a study which sought to determine the extent to which factors that cause interest rate fluctuation influence financial performance of commercial banks operating in Kenya. Jebiwott and Kalui (2009) identify the factors which cause interest rate fluctuations as maturity mismatch, inflation rate, cash reserve ratio, CBK liquidity ratio, and default rate. The population for the study was 42 banks. However, the study sample constituted of 20 banks. The secondary data study period was from the year 2010 to 2015. Both descriptive and inferential statistics were utilized to analyze the data collected. The findings revealed that maturity mismatch, inflation rate, and default rate had a negative effect on bank profitability. In addition, liquidity ratio and cash reserve ratio positively impacted bank profitability.

#### **2.4.5. Market risk and Market Returns**

Haider, Hashmi and Ahmed (2017) carried out a study in Pakistan which sought to determine the relationship between stock return volatility and systematic risk factors. The study examined the following systematic risk factors: exchange rate, money supply, inflation, real interest rate, and industrial production. The study data period was between the year 2000 and 2014. The study utilized vector auto regressive models and

generalized auto regressive conditional heteroskedastic (GARCH) model. The findings of the study revealed a bidirectional relationship between systematic risk factors and stock return volatility. In particular, real interest rate volatility does not have a relationship with stock return volatility, similarly, money supply does not have a direct effect on stock market returns. Haider *et al.* (2017) further postulate that inflation rate volatility has a significant effect on stock returns. The findings further revealed that exports and industrial growth production has a significant effect on stock returns.

Ekinci (2016) carried out a study in Turkey which sought to determine the relationship between market risk and credit risk within the banking sector. The study measured market risk in terms of currency risk and interest rate risk. The study utilized the GARCH model. The study data period was from the year 2002 to 2015. The findings of the study revealed a positive significant relationship between market and credit risks and bank stock return volatility.

Similarly, Mehrara, Falahati and Zahiri (2014) conducted a study which sought to determine the relationship between stock returns and systematic risk. The study was carried out in Iran's Tehran Stock Exchange. The CAPM was utilized to establish the relationship between the variables of the study. The study sampled 50 companies listed at the Tehran Stock Exchange. The study adopted a panel data model to draw inference from the data collected. The findings of the study revealed that there is a statistically positive significant relationship between systematic risk and stock returns.

In Kenya, Karwitha, Muturi and Oluoch (2018) carried out a study which sought to determine the relationship between market returns and market risk. The study collected

data from the 64 companies that are listed at the NSE. The study utilized a panel data regression model to draw inference from the data collected. The study further utilized the capital asset pricing model (CAPM). Market risk in this case was measured using beta. The findings of the study revealed that there was a significant negative relationship between market risk and market return. According to Karwitha *et al.* (2018), 27.4672% of variations in market return are explained by market risk.

Muiruri (2014) carried out a study in Kenya which sought to determine the relationship between market returns and systematic risk at the NSE. Systematic risk in this case was measured using the CAPM model. The study sourced secondary data from the year 2009 to 2012. The study utilized a simple regression model to draw inference from the data collected. According to Muiruri (2014), different NSE market segments and companies have their own unique betas which implies that the NSE market is an informally efficient market. Consequently, every firm and market segment has its unique systematic risk factor. The findings from the study reveal that systematic risk does significantly and negatively influence stock returns.

In contrast, Macharia (2018) conducted a study in Kenya which sought to determine the relationship between shareholder stock return and systematic risk. The study was based theoretically on the modern portfolio theory and CAPM. The study obtained data from 20 stocks listed under the NSE 20 share index. The data period for the study was from the year 2010 to 2015. CAPM was utilized to measure systematic risk. The findings revealed a significant positive relationship between systematic risk and stock returns.

Mwaura, Muturi and Waititu (2017A) carried out a study in Kenya which sought to determine the relationship between stock returns and financial risk. The study sourced for secondary data from nine banks for the period between the years 2006 to 2015. A multivariate generalized least square regression model was utilized to analyze the data collected. Financial risk was measured using the following variables: capital risk, liquidity risk and market risk. In this case, market risk was measured using exchange rate risk. The findings of the study revealed a significant positive relationship between the three independent variables with the dependent variable.

### **2.5. Critique of Literature**

Numerous studies have been examined with reference to the study variables. However, empirical literature is inconclusive about the relationship between the independent and dependent variables of the study. This section critiques the empirical and theoretical evidence studied. Arif and Anees (2012) examine the relationship between liquidity risk and bank performance. From the findings of the study, liquidity risk adversely affects bank performance. The scope of the findings can be described as limited since the study only focused on data between 2004 and 2009. The data collection period was short to derive trends and variations.

Similarly, Karthigeyan and Mariappan (2017) conducted a study in India which sought to determine the extent of liquidity management on private banks. Findings of the study revealed that if a bank does not adequately mitigate risks arising from the mismatch of long-term assets and short term liabilities; the commercial bank stands to face liquidity

challenges. The study was limited because it focused on four private banks and left out banks which are publicly listed in securities exchange.

Hassan *et al.* (2019) study focused on the relationship between liquidity risk and bank stability on conventional and Islamic banks. The findings revealed a negative relationship between liquidity risk and credit risk. However, Hassan *et al.* (2019) study did not reveal the disparity of these relationships with reference to Islamic and conventional banks. Similarly, Bourakba and Belouafi (2015) sought to determine the effect of maturity mismatch on the performance of Islamic banks and conventional banks. The findings of the study revealed that Islamic banks were not adversely affected as the conventional banks during the 2007-2008 global financial crisis because Islamic banks match liabilities with assets. On the contrary, conventional banks lend long term with funds short term borrowed and therefore were in a crisis during the 2007-2008 global financial crisis. The study does not make recommendations on how conventional financial institutions can manage the mismatch between their assets and liabilities. In addition, the study does not shed light on the influence of mismatch risk on the market returns of financial institutions.

Jebiwott and Kalui (2019) sought to determine how the factors that cause interest rate fluctuation influence financial performance of commercial banks operating in Kenya. The findings of the study revealed that maturity mismatch, inflation rate, and default rate had a negative effect on bank profitability. However, the findings of the study do not shed light on the relationship between interest rate risk and the market returns of banks. Similarly, Were and Wambua (2014) sought to identify the factors which influence



interest rate spread by commercial banks in Kenya. Study findings revealed that the factors which positively influence interest rate spread include operational costs, return on assets, credit risk, and bank size. However, the study does not shed light on the relationship between interest rate spread and the market returns of banks.

In the same vein, Karanja (2013) sought to determine the relationship mortgage financing and the commercial bank financial performance. The findings revealed that there was a positive relationship between mortgage financing and bank financial performance. The study does not identify the extent to which mortgage fallout rate influences the financial performance and market returns of mortgage originating firms.

Davis and Zhu (2009) carried out a study which sought to determine the relationship between commercial property prices and bank performance. The findings revealed that there is a positive relationship between these property prices and bank performance. In addition, study findings further revealed that there was a negative relationship between commercial property price and bad loan ratios and net interest margin. However, the study does not clearly outline the target population. Consequently, the findings for these studies cannot be generalized for all financial institutions. In addition, the findings of the study do not reveal the influence of default risk and commercial property prices influence the market returns of financial institutions. Similarly, Bhattarai (2016) sought to determine the influence of credit risk on the financial performance of commercial banks. The findings revealed that non-performing loan ratio has a negative influence of the financial performance of banks. However, the data collection period was short to derive trends and variations.

Ntiamoah *et al.* (2014) examined the influence of default loan rate on the financial performance of microfinance institutions. Findings of the study revealed a significant positive correlation between profitability and loan default rate. The study was limiting due to the fact that it only focused on one section of the financial sector. Consequently, the findings cannot be generalized for the entire financial sector. Similarly, Kauna (2016) sought to determine the influence of credit risk management on bank financial performance. The findings of Kauna's study revealed a positive relationship between credit risk monitoring and credit risk identification and bank financial performance. Study findings are limited due to the fact that data collection period was short to derive trends and variations.

Ngétich and Wanjau (2011) sought to examine the extent to which interest rate spread influences the level of non-performing assets in banks. Findings of the study revealed that interest rates significantly influence non-performing loans. However, the study findings do not reveal the relationship between non-performing assets and the market returns of banks. In the same light, Mayer *et al.* (2009) sought to identify the factors that cause a rise in rates of mortgage defaults. Study findings revealed that poor underwriting standards are the major cause of rise in mortgage default rate. However, the findings of the study do not reveal the relationship between default rate and the market returns of mortgage firms.

With reference to price risk, Ndung'u (2012) sought to examine the relationship between interest rate volatility and stock returns. The study findings revealed interest rates do affect stock market performance. The findings of the study was limited since it only

focused on interest rate volatility and did not include other risk factors in its model. In addition, the study does not reveal the relationship between interest rate and market returns of banks listed at the NSE. Similarly, Ahmed *et al.* (2018) sought to determine the relationship between stock return volatility and systematic risk factors. Study findings reveal that there is a negative relationship between interest rate fluctuations and bank profitability. However, the findings of the study do not assess the impact of interest rate fluctuations on bank market return. In the same light, Wamalwa and Mukanzi (2018) sought to determine the influence of financial risk management on bank financial performance. Study findings revealed that there is a negative relationship between interest rate fluctuations and bank profitability. The study population only focused on one region – Kakamega County. Thus, the findings of the study cannot be generalized for the entire country. In addition, study does not reveal relationship between price risk and market return.

## **2.6. Research Gap**

Existing theories provide contradictory explanations as to how mortgage origination risk affect market performance of market originators. For instance, credit risk by mortgage originators can be significantly managed through the application of the title theory. However, mortgage originators default risk cannot be significantly reduced through the application of the lien theory. Similarly, through the application of the MPT theory; mortgage originating firms in Kenya could mitigating various mortgage risk. For instance, mismatch risk and price risk could be mitigated through derivative instruments.

In the same vein, there is contrast in the findings provided through empirical literature. For instance, research studies relating to default risk, market returns, and financial performance. Bhattarai (2016), Alshatti (2015), Muriithi *et al.* (2016), and Kauna (2016) carried out studies whose findings revealed the default or credit risk does significantly influence the financial performance of financial institutions. However, similar studies provide contradictory findings. For instance, Kithinji (2010) argues there is no significant relationship between the level of non-performing loans and bank profitability. Arif and Anees (2012) and Bordeleau and Graham (2010) also give conflicting findings on the relationship between liquidity risk and financial performance of financial institutions.

Similarly, Gull and Zaman (2013) argue that interest rates significantly influence bank financial performance. However, Ayub and Masih (2013) carried out a study whose findings revealed that there is no significant relationship between interest rates and Islamic bank stock prices. Consequently, empirical literature is inconclusive with reference to how the study's independent variables affect market returns and performance. In addition, there is a gap in empirical literature relating to the influence of mortgage risk on the market returns of public mortgage originators in Kenya. In the same light, empirical literature does not shed light on the moderating effect of market risk on the effect of mortgage risk on market returns of mortgage originators. Majority of studies conducted focus on how risk influences bank profitability. This presents a gap in empirical and theoretical literature.

## **2.7. Summary**

The literature review identified and critiqued the theoretical concepts that related to the variables of the study. The theories – modern portfolio theory, the loanable funds theory, title and lien theory, liquidity preference theory, efficient market hypothesis, and the random walk theory – were utilized to establish the relationship between the mortgage risk and market returns of mortgage originating firms. In addition, this chapter conceptualized and operationalized the relationship between the mortgage risk and market returns of mortgage originating firms. The literature review further explored existing literature relating to the objectives of this study. In addition, this chapter identified both empirical and theoretical gaps which the study sought to fill.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1. Introduction**

Kothari (2004) defines research methodology as the process of data or information collection for the purpose of decision making. Research methodology can also be defined as the steps which a researcher undertakes when conducting a research study (Mugenda & Mugenda, 2003). In this case, this chapter outlines the steps in which the researcher undertook when collecting data that enabled the validation of the study's research hypotheses. This chapter is divided into the following sub-sections: research philosophy, research design, target population, sample and sampling technique, data and data collection procedure, and data processing and analysis.

#### **3.2. Research Philosophy**

The study adopted a positivism research philosophy. Research philosophy is described as the process in which a study collects and analyzes data to enable it meet its research objectives (Saunders, Lewis & Thornhill, 2009). According to Tsang (2016), there are four scopes of research philosophies that can be adopted in business: pragmatism, positivism, realism, and interpretivist. Saunders *et al.* (2009) refers to pragmatic research philosophy as the process of adopting mixed or multiple research methods – for instance quantitative and qualitative research approaches – in order to best answer a study's research problem. Positivism research philosophy adheres to the view that truth is only learnt through science (Tsang, 2016). In addition, it depends on quantifiable data which is analyzed through statistical analysis. Realism philosophy is defined as idea of

independence of reality from the human mind (Saunders *et al.*, 2009). In addition, realism research philosophy utilizes both qualitative and quantitative research approaches.

Interpretivism research design utilizes small samples with particular focus on in-depth investigations (Tsang, 2016). In addition, it focuses on human nature understanding and thus qualitative research approach is utilized. In this case, the study adopted a positivism research philosophy. The study adopted this research philosophy due to the fact that the data collected was quantitative. In addition, it would enable the validation of the research hypotheses for the study. Consequently, positivism research philosophy was applied to determine the relationship between mortgage risk and market returns for public mortgage originators in Kenya. This was accomplished through the use of quantitative and statistical models to validate the study's hypotheses.

### **3.3. Research Design**

Descriptive research design was adopted to carry out the study. Mugenda and Mugenda (2003) define research design as the establishment of course of action or steps which the researcher will follow in order to gather data that will be analyzed in order to come up with conclusions for a research study. Research design can also be defined as the strategy a researcher utilizes to incorporate different study components in a logical technique in order to identify a solution to a research problem (Leavy, 2017). There are various forms of research designs: descriptive, exploratory, case studies, experimental, non-experimental, cohort, and causal research designs among others.

The researcher adopted quantitative research design and descriptive research design. According to Leavy (2017), quantitative research design is used to develop mathematical models which are used to test the study's hypothesis. In order to accept or nullify the research hypotheses for the study, mathematical models – quantitative research design - were utilized to draw inference from the secondary data collected. Descriptive research design is described as a study conducted to determine the characteristics of a particular element or factor for example: age, income (Kothari, 2004). In this case, descriptive research design was used to determine the effect of mortgage risk on market returns of public mortgage originators in Kenya. On the other hand, quantitative research design was utilized to validate the study's research hypotheses.

### **3.4. Target Population**

Welman and Kruger (2001) define population as the total number of elements or individuals which a research study seeks to determine or draw inferences from. The population for the study was Kenya's 11 public listed mortgage originators. According to the NSE website (2017), there were 11 publicly listed mortgage originators in Kenya: Barclays Bank Limited, CFC Stanbic Holdings Limited, Diamond Trust Bank Kenya Limited, Equity Group Holdings, HF Group Limited, I & M Holdings Limited, KCB Group Limited, National Bank of Kenya Limited, NIC Bank Limited, Standard Chartered Bank Kenya Limited, and the Co-operative Bank of Kenya Limited.

The eleven public mortgage originators were chosen as appropriate because the regulatory requirements force them to publish financial data. In addition, they were listed in the stock market and therefore it was possible to track the performance of their



share prices and consequently their related market returns. According to CBK (2018), five large peer banks and one medium sized bank control approximately 76.1% of the mortgage market in Kenya. Consequently, the target population for the study was well representative of mortgage market in Kenya.

### **3.5. Sample and Sampling Technique**

A sample is described as a sub-set or proportion of the entire population being studied through a research process (Welman & Kruger, 2001). A sample should be scientifically selected from the population in order to ascertain its credibility and validity. The technique of selecting a sample from a target population is referred to as sampling technique (Kothari, 2004; Mugenda & Mugenda, 2003). In addition, there are two forms of sampling techniques: probability sampling technique, and non-probability sampling technique.

For probability sampling, members of population have equal chance of getting selected in the sample (Kothari, 2004). Probability sampling makes use of a sampling frame. A sampling frame is defined as a list of items, elements or people making up a population being studied through a research process (Kothari, 2004). Similarly, Mugenda and Mugenda (2003) define a sampling frame as a list which comprises of an entire target population under study or investigation. Examples of probability sampling technique include: simple random sampling, stratified random sampling, systematic sampling, multistage sampling, and cluster sampling techniques. However, for non-probability sampling – some members of the population under study have a higher chance of getting selected in sample as compared to others. Examples of non-probability sampling

technique include: convenience sampling, quota sampling, judgmental sampling, and snowball sampling techniques.

This study was fashioned as a census study. A census is where all the elements or members of a population participate in a study's data collection process (Kothari, 2004). For this case, a census was conducted on the target population due to the fact that the population under investigation was not large. According to the Nairobi Securities Exchange (2017), there are only 11 listed public mortgage originators listed in Kenya. Consequently, it was necessary to examine all of the study's population in order to comprehensively validate to research hypotheses for the study. This implies that the researcher collected data from all the 11 mortgage originators that were publicly listed at the NSE.

### **3.6. Data and Data Collection Procedure**

A research instrument is a tool which a researcher uses for data collection (Kothari, 2004). According to Mugenda and Mugenda (2003), there are two sources of data for any research process: primary and secondary sources. Primary data collection is data which is used for the specific purpose it was collected for (Francis, 1998). However, secondary data is defined as data which is used for other purposes other than its original purpose. Primary data can be collected through: questionnaires, interviews, observation, and focus groups discussions (Mugenda & Mugenda, 2003). Data from secondary sources is sourced from articles in journals, newspapers, magazines, and financial reports (Kothari, 2004).

For this case, the study sourced its data from secondary sources. The researcher sourced data from: CBK bank supervision reports, and the NSE. In addition, data was also sourced from financial statements released by the 11 listed public mortgage originators in Kenya. Table 3.1 presents the data collection procedure for the study. Secondary annual data was sourced from the year 2009 to 2019. The data collection sheet can be viewed on Appendix 1.

**Table 3.1: Data Collection Table**

<b>Information to be Collected</b>	<b>Source</b>
Share prices of public mortgage originators	Nairobi Securities Exchange (NSE)
NSE-20 Share index	
91-day Treasury bill rate from CBK	Central Bank of Kenya (CBK)
Annual residential mortgage loan applications	Mortgage Originators
Financial Position Statement Short-term deposits	
Financial Position Statement residential mortgage loans at the end of every year	Central Bank of Kenya Bank Supervision Report
Financial Position Statement non-performing residential mortgage loans at the end of every year	
Residential mortgage interest rates	

### **3.7. Data Processing and Analysis**

This section outlines the methodology which the study analyzed and drew inference from the secondary data collected. This section is subdivided into the following subsections: model specification, variable operationalization, model diagnostic tests, descriptive statistics, and test of hypothesis.

### **3.7.1. Model Specification**

A panel data regression model was used to draw inference from the secondary data collected. Panel data comprises of longitudinal data collected from different cross sections over a given period of time (Gujarati, 2011). According to Gujarati (2011), panel data analysis is effective in modelling the individual and common behaviors of groups. In addition, panel data analysis reveals more efficiency, variability, and more information as compared to cross-sectional and time series data. In addition, Gujarati (2011) postulates that panel data minimizes biases in statistical estimation.

According to Sharma (2007), panel data regression analysis refers to a statistical technique utilized to analyze the relationship between two or more variables – one or more independent variables and a dependent variable. In addition, panel data regression analysis explains the extent and degree to which one or more independent variables influences a dependent variable. Sharma (2007) further argues that regression analysis reveals the strength of influence of numerous independent variables on a dependent variable.

According to Gujarati (2011) and Pallant (2005), panel regression models are based on the following assumptions firstly, the independent variables and dependent variable must have a linear relationship. Secondly, the residuals are normally distributed. Thirdly, there should be no multicollinearity: there is no high level of correlation between the independent variables. Fourthly, homoscedasticity: the variance of error terms of the independent variables should be constant. Fifthly, data for the analysis should be stationary.

The study utilized a panel regression model to determine the extent and degree to which mortgage risk influences the market return for publicly listed mortgage originators in Kenya. In addition, the study would reveal the strength of influence for each independent variable on the dependent variable. The independent variables for this model were: RM fallout risk, RM mismatch risk, RM default risk, and RM price risk while the dependent variable was the market returns of publicly listed mortgage originators. Below is the representation of the model:

$$Y_i = \beta_0 + \beta_1 X_{1,t} + \beta_2 X_{2,t} + \beta_3 X_{3,t} + \beta_4 X_{4,t} + \epsilon_i$$

$\beta_1, \beta_2, \beta_3, \beta_4$ , represent the specific beta coefficients.  $X_1$  represents residential mortgage fallout risk,  $X_2$  represents residential mortgage mismatch risk,  $X_3$  represents residential mortgage default risk, and  $X_4$  represents residential mortgage price risk.  $\epsilon_i$  represents the error term in the model.  $\beta_0$  represents the constant while  $Y_i$  represents market return of public mortgage originators. The model below presents the moderated panel data regression equation for the study.  $M$  represents the moderator which is mortgage originator firm market risk (firm market beta).

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 M + \beta_3 (X * M) + \epsilon_{it}$$

### 3.7.2. Variable Operationalization

According to Abbott and McKinney (2013), variable operationalization refers to how study variables are defined and measured. In this case, variable operationalization refers to the measures which the study employed to measure the independent variables – mortgage risk – moderating variable – firm market risk - and the dependent variable –

market returns – for the study. The Table 3.2 presents the study variables and how each of the specific variables for the study were measured. In addition, the table reveals specific data source for each of the study variables.

**Table 3.2: Study Variables**

<b>Variable</b>	<b>Measure</b>	<b>Data</b>	<b>Source</b>
Fallout Risk	Ratio of residential mortgage non-uptake to residential mortgages approved	<ul style="list-style-type: none"> <li>• Annual residential applications</li> <li>• Annual residential mortgage non-uptake</li> </ul>	Financial Statements of the mortgage originators Central Bank Supervision Reports
Default Risk	Annual Residential Mortgage default ratio	<ul style="list-style-type: none"> <li>• Non-performing Residential Loans</li> <li>• Total residential loan mortgages and advances</li> </ul>	Financial Statements of the mortgage originators Central Bank Supervision Reports
Mismatch Risk	Short-Term Deposits to Residential Mortgage ratio	<ul style="list-style-type: none"> <li>• Short term bank deposits at public mortgage originators</li> <li>• Residential mortgages loans and advances</li> </ul>	Central Bank Supervision Reports
Firm Market Risk	Firm Market Beta	<ul style="list-style-type: none"> <li>• NSE 20 Share Index</li> <li>• 91-Day T-Bills Rate</li> <li>• Mortgage Originators Share Prices</li> </ul>	NSE CBK Reports

Variable	Measure	Data	Source
Price Risk	Residential mortgage rates volatility as measured by 3-point moving Standard deviation	<ul style="list-style-type: none"> <li>• CBK rates</li> <li>• Residential Mortgage Rates</li> </ul>	CBK Public Mortgage Originators
Market Returns of Mortgage Originators	Mortgage adjusted market returns	<ul style="list-style-type: none"> <li>• Share Prices for Public Mortgage Originators</li> </ul>	NSE

Fallout risk refers to the risk that a potential mortgage borrower fails or withdraws from completing their loan mortgage transaction (Kolb & Overdahl, 2010). Taff (2003) defines fallout risk as the possibility that a potential mortgage borrower does not close on their approved loan application. Fallout risk was measured using the ratio of total number of actual residential mortgage uptakes by customers to the total number of residential mortgage applications with commitment letters from mortgage originators.

$$\text{Fallout Ratio} = \frac{\text{Total Number of Actual Residential Mortgage Uptakes}}{\text{Total Number of Residential Mortgage applications with Commitment Letters}}$$

Default risk is also referred to as credit risk. According to Apostolik and Donohue (2015), this is the risk that accrues to a lender when the borrower fails to make required payments. Default risk in this case was measured using: the non-performing loans ratio. The non-performing loans ratio was measured as the ratio of non-performing residential mortgage loans to total residential mortgage loans and advances.

$$\text{Non – Performing Loans Ratio} = \frac{\text{Non – Performing Residential Mortgage Loans}}{\text{Total Residential Mortgage Loans and Advances}}$$

According to Li and Zhang (2017), mismatch risk describes disparities between fund sources and funds use which could result in default and liquidity challenges. Mismatch risk was measured in terms of the ratio between short term bank deposits at the end of every year and total residential mortgages at the end of every year.

$$\text{Mismatch Ratio} = \frac{\text{Short Term Deposits}}{\text{Total Residential Mortgage Loans and Advances}}$$

According to Shiller (2012), price risk is the possibility of adverse effect in the value of the mortgage commitment as a consequence of changes in mortgage rates. Price risk was measured using a 3-point moving standard deviation of the annual residential mortgage interest rates. Price risk was measured using the formula illustrated below. Where SD represents standard deviation,  $i$  represents residential mortgage interest rate,  $\bar{I}$  represents the 3-point residential mortgage interest rate average.

$$SD = \frac{1}{3} \sum_{i=1}^3 \sqrt{(i - \bar{I})^2}$$

Stock market return refers to the returns that stockholders generate out of securities they hold in the stock market (Johnson, 2014). Knight and Bertoneche (2000) argue that stock market return can be measured in terms of dividends and gains made from changes in stock market prices. In this case, stock market return was weighted with reference to residential mortgages and thereby measured from stock market prices. The weighted market returns for publicly listed mortgage originators were measured using the ratio displayed below. Where  $P_t$  is the current annual stock price,  $P_{t-1}$  is the previous year stock price, and  $R_i$  is the mortgage weighted market return.



$$R_i = \frac{P_t - P_{t-1}}{P_{t-1}} \times 100\% * \frac{\text{Residential Mortgage Loans \& Advances}}{\text{Total Loans Advanced}}$$

Firm market risk is also referred to as systematic risk. Bierman and Smidt (2003) define systematic risk as risks which affect all institutions within an economy. In this case, the moderator (firm market risk) was measured using the firm market beta. The firm market beta was calculated from the Capital Asset Pricing Model (CAPM).

$$\text{Expected Return} = r_f + \beta(r_m - r_f)$$

$r_f$  = risk free rate

$\beta$  = Beta

$r_m$  = return on the market

### 3.7.3. Model Diagnostic Tests

Credibility of the data collected was tested through the following diagnostic tests: Hausman Specification Test, Heteroscedasticity test, Autocorrelation test, Multicollinearity test, Normality test, Granger Causality test, and Unit Root Test.

#### 3.7.3.1. Hausman Specification Test

The study carried out a Hausman specification test to determine which of the two panel data regression models – Fixed Effects Model (FEM) or Random Effect Model (REM) – to utilize. The Hausman Specification Test was developed with Jerry Hausman, De-Min Wu, and James Durbin (Baltagi, 2012). According to Baltagi (2012), a Hausman specification test is carried out to detect the existence of endogenous regressors a study's panel data regression model. The existence of endogenous regressors results in the

breach of one of the conventions of ordinary least squares which states that there should be no correlation between error term and predictor variable.

### **3.7.3.2. Heteroscedasticity Test**

The study carried out a heteroscedasticity test in order to identify the data's challenges with reference to cross-sectional data. Heteroscedasticity is where the variability of a variable is not equal across the range of values of a second variable that predicts it (Gujarati, 2011). In addition, the presence of heteroscedasticity can meaningfully influence the results from a panel data regression model because it invalidates statistical tests of significance that assume that modelling errors are uncorrelated and uniform – hence that their variances do not vary with the effects being modelled. According to Gujarati (2011), the White's test and the Breusch-Pagan test can be utilized to test for heteroscedasticity in the data collected. The Breusch-Pagan test in this case was utilized to establish whether the variance of errors in the study's regression model were constant.

### **3.7.3.3. Autocorrelation Test**

Autocorrelation tests were performed using the Durbin Watson Test (D) to determine data challenges that may arise from using time series data. According to Gujarati (2011), an autocorrelation test is carried out to determine the existence of pattern of error term observations which may affect the regression model applied in the study. The Durbin Watson Test was utilized to test the relationship between variables separate from each other by a given time lag.

#### **3.7.3.4. Multicollinearity Test**

According to Gujarati (2011), it is necessary to determine the presence of multicollinearity because its presence restricts the chance to determine the effect of each independent variable on the study's dependent variable. Multicollinearity was determined using tolerance level and the variance inflation factor (VIF). According to Pallant (2005), a tolerance level of above 0.1 is acceptable and reflects the lack of presence of multicollinearity between a study's independent variables. In addition, a VIF of less than 10 signifies the lack of multicollinearity in a given set of data.

#### **3.7.3.5. Normality Test**

According to Pallant (2005), normality is described as a bell-shaped symmetrical curve which has the greatest frequency of scores in the middle and with smaller frequencies extending towards the extremes. The test for normality confirms whether the data collected for the study variables is from a normal population. It is necessary to carry out a normality test when carrying out regression analysis (Gujarati, 2011). This is attributed to the fact that normality of data is one of assumptions of panel regression analysis modeling.

The test for normality in this case was measured using Kolmogorov-Smirnov statistic and the Shapiro-Wilk test. According to Gray (2016), a significance value of more than 0.05 for the Kolmogorov-Smirnov test signifies normality in a distribution. The Shapiro-Wilk test was published by Martin Wilk and Samuel Sanford Shapiro in 1965. Gray (2016) further postulates that a significance value of above 0.05 for the Shapiro-Wilk test

reveals that the data has a normal distribution. However, if the significance value is below 0.05, the data significant deviates from a normal distribution.

#### **3.7.3.6. Granger Causality Test**

Granger causality test is a statistical test carried out to determine the interconnection between two variables in a time series (Kirchgassner & Wolters, 2008). In addition, the test is a probabilistic interpretation of causality; it utilizes data sets to identify patterns of correlation. Similarly, Gujarati (2011) defines Granger causality test as a statistical hypothesis test for determining whether one time series is useful for forecasting another. Causality is closely related to the idea of cause-and-effect, although it is not exactly the same. A variable X is causal to variable Y if X is the cause of Y or Y is the cause of X (Kirchgassner & Wolters, 2008). However, with granger causality, a researcher tests a true cause-and-effect relationship; what a researcher seeks is to know if a particular variable comes before another in the time series.

#### **3.7.3.7. Unit Root Test**

The unit root tests were conducted to test the stationarity and co-integration of the available data. Gujarati (2011) argues that the statistical properties of a time series data should not change over time. In addition, a time series is deemed stationary if time does not cause change in the shape of the distribution. According to Tabachnick *et al.* (2019), there are several techniques of testing for order of integration: Augmented Dickey-Fuller (ADF) test and Phillip-Perron (PP). In this case, the Augmented Dickey Fuller (ADF) was used to test the order of integration of the variables. According to Tabachnick *et al.* (2019), ADF test was propagated by Dickey and Fuller (1979, 1981). Both the ADF and

the PP tests rely on rejecting a null hypothesis of unit root (the series are non-stationary) in favor of the alternative hypotheses of stationarity. The tests are conducted with and without a deterministic trend (t) for each of the series.

To test for stationarity of time series variables which often exhibit stochastic trend, this study employed the Augmented Dickey–Fuller (ADF) techniques which are based on the McKinnon critical values. The lag lengths were automatically determined in accordance with Akaike information criterion. The Null hypothesis ( $H_0$ ) states that a series is non-stationary against the alternative hypothesis ( $H_1$ ) that a series is stationary.

#### **3.7.4. Descriptive Statistics**

According to Sharma (2007), descriptive statistics is defined as descriptive factor that summarizes a given set of data which can represent either a population or a sample. Descriptive statistics can be calculated using the measures of central tendency or the measures of dispersion. The measure of central tendency indicates the center of well-ordered data (Sharma, 2007). Some measures of central tendency include: mode, median, and the mean. The measures of dispersion indicate how the data is dispersed around the arithmetic mean. Some measures of dispersion include: skewness, kurtosis, standard deviation, and the variance.

The study utilized descriptive statistics to summarize the quantitative data collected. The Statistical Package for Social Science (SPSS) was utilized for descriptive analysis. In addition, the study utilized Microsoft Excel for statistical descriptive analysis. The following descriptive statistical tools were utilized: arithmetic mean, standard deviation, skewness, coefficient of variation and kurtosis. Descriptive statistics was used to

summarize the data collected, understand the features of the data collected, and to further establish the characteristics of both the independent, moderating and dependent variables.

### **3.7.5. Tests of Hypotheses**

The study furthermore utilized inferential statistics to draw inference from the data collected. The study utilized the statistical software STATA and SPSS to carry out the inferential statistics. Bivariate and multivariate panel data regression model analyses were utilized to determine the relationship and association between study variables. Bivariate panel data regression analysis is the examination of the relationship between two variables (Sharma, 2007). Bivariate results – in this case – revealed the extent, strength, and significance between the study's independent variables and dependent variable.

A multivariate panel data regression model was used to draw statistical inference from the quantitative data collected. R-square statistic was utilized to determine the contribution of independent variables – residential mortgage fallout risk, residential mortgage mismatch risk, residential mortgage default risk, and residential mortgage price risk – on the dependent variable (market returns of publicly listed mortgage originators). In addition, the standard normal distribution (z) test was utilized. The standard normal distribution test (z test) was used to validate study's null hypotheses at a standard probability significance value of 0.05. In addition, chi-square test was also utilized.

Bivariate panel data regression models were further utilized to validate hypotheses for the study. In addition, standard normal distribution test (z test) were utilized to validate study's null hypotheses at a standard probability significance value of 0.05. The bivariate regression models for the hypotheses tests are presented below:

H<sub>01</sub>: Residential mortgage fallout risk has no significant effect on market returns of publicly listed mortgage originators in Kenya. The bivariate panel regression model is represented below.  $\beta_1$  represent the specific beta coefficient.  $X_1$  represents residential mortgage fallout risk.  $\epsilon_i$  represents the error term in the model.  $\beta_0$  represents the constant while  $Y_i$  represents market return of public listed mortgage originators.

$$Y_i = \beta_0 + \beta_1 X_{1,t} + \epsilon_i \dots\dots\dots(i)$$

H<sub>02</sub>: Residential mortgage mismatch risk has no significant effect on market returns of publicly listed mortgage originators in Kenya. The bivariate panel regression model is represented below.  $\beta_1$  represent the specific beta coefficient.  $X_1$  represents residential mortgage mismatch risk.  $\epsilon_i$  represents the error term in the model.  $\beta_0$  represents the constant while  $Y_i$  represents market return of public listed mortgage originators.

$$Y_i = \beta_0 + \beta_1 X_{1,t} + \epsilon_i \dots\dots\dots(ii)$$

H<sub>03</sub>: Residential mortgage default risk has no significant effect on market returns of publicly listed mortgage originators in Kenya. The bivariate panel regression model is represented below.  $\beta_1$  represent the specific beta coefficient.  $X_1$  represents residential mortgage default risk.  $\epsilon_i$  represents the error term in the model.  $\beta_0$  represents the constant while  $Y_i$  represents market return of public listed mortgage originators.

$$Y_i = \beta_0 + \beta_1 X_{1,t} + \varepsilon_i \dots\dots\dots(iii)$$

H<sub>04</sub>: Residential mortgage price risk has no significant effect on market returns of publicly listed mortgage originators in Kenya. The bivariate panel regression model is represented below.  $\beta_1$  represent the specific beta coefficient.  $X_1$  represents residential mortgage price risk.  $\varepsilon_i$  represents the error term in the model.  $\beta_0$  represents the constant while  $Y_i$  represents market return of public listed mortgage originators.

$$Y_i = \beta_0 + \beta_1 X_{1,t} + \varepsilon_i \dots\dots\dots(iv)$$



## CHAPTER FOUR

### FINDINGS, ANALYSIS AND DISCUSSIONS

#### 4.1. Introduction

This chapter presents the results collected from the study's data collection process. It further analyses the data collected through descriptive and inferential statistics in order to validate the study's research hypotheses. For descriptive analysis, various measures of central tendency and dispersion were utilized to summarize the data collected. In addition, inferential statistics was utilized to draw inference from the data collected. This chapter further presents the results for diagnostic tests conducted on the secondary data collected. This chapter is divided into the following subsections: descriptive analysis, model diagnostic tests, correlation analysis, bivariate panel data regression results, moderated bivariate panel data regression results, multivariate panel data regression results, and moderated multivariate regression results.

#### 4.2. Descriptive Analysis

Descriptive statistics is defined as a technique of quantitatively summarizing data and information (Sharma, 2007). Descriptive statistics can also be defined as a branch of statistics that deals with the numbers utilized to describe and summarize information and data collected for a particular experiment (Mendenhall, Beaver & Beaver, 2008). According to Mendenhall *et al.* (2008), the following are the measures utilized in descriptive statistics: line charts, pie charts, bar charts, measures of frequency, measures of position, measures of dispersion, and measures of central tendency. In this case, descriptive statistics was utilized to summarize the quantitative data collected. The study

utilized the measures of central tendency and the measures of dispersion to summarize the secondary data collected. In particular, the mean, standard deviation, coefficient of variation, skewness, and kurtosis were utilized to establish the characteristics of the independent, moderating, and dependent variables. Table 4.1 presents the descriptive statistic results that were derived from the data collected.

**Table 4.1: Descriptive Statistics**

	N	Mean	Std. Deviation	CoV	Skewness		Kurtosis	
					Statistic	Std. Error	Statistic	Std. Error
					Fallout Ratio	121	.0976	.08453
Mismatch Ratio	121	.1194	.08349	.69924	.348	.220	.521	.437
Default Ratio	121	.0796	.04219	.53002	.828	.220	.019	.437
Residential Mortgage Rate	121	.2193	.11195	.51048	.507	.220	-.149	.437
Market Return	121	.0905	.04198	.46386	.484	.220	.659	.437
Firm Market Risk	121	1.059	.78315	.73923	.409	.220	-.154	.437
Valid N (listwise)	121							

#### **4.2.1. Descriptive Statistics for Residential Mortgage Fall Out Ratio**

Table 4.1 presents the descriptive statistics for the residential mortgage fallout ratio. In this case, residential mortgage fallout ratio was measured using the ratio of total number

of actual residential mortgage uptakes by customers to the total number of residential mortgage applications with commitment letters from mortgage originators. From the findings presented in Table 4.1, the mean for residential mortgage fallout risk was 0.0976 with a standard deviation of 0.08453. This suggests that the average residential mortgage fallout risk for the publicly listed mortgage originators is 9.76%. In addition, the standard deviation results suggest that the variation of residential mortgage fallout risk among public mortgage originators is not overly dispersed. Findings further revealed a coefficient of variation of .86608. This suggest that residential mortgage fallout risk has the highest level of volatility when compared to all the other risk indicators.

According to Deep (2006), skewness reveals the degree in which a frequency distribution deviates away from a normal distribution. In addition, skewness ranges between positive three and negative three – both of which are extreme values which reveal positive skewness and negative skewness respectively. According to the findings presented in Table 4.1, the level of skewness for fallout risk was 0.093. Deep (2006) argues that symmetric distributions (normally distributed) have a skewness of zero. Consequently, the frequency distribution for residential mortgage fallout risk does not significantly deviate to a great extent away from a normal distribution.

The results further reveal a kurtosis statistic of 0.227. This implies the distribution for residential mortgage fallout risk does not significantly deviate from a normal distribution. According to Gujarati (2011), a kurtosis of 0 calculated using statistical software reveals a normal distribution. This is attributed to the fact that statistical

software subtracts 3 from kurtosis (excess kurtosis) – which represents a mesokurtic distribution.

This finding is in line with that of empirical literature. Kalui and Kenyanya (2015) for instance carried out a study which sought to identify the factors which hinder Kenyans from accessing mortgage finance. The findings of their study revealed that only 11% of Kenyans living in urban areas have utilized mortgage finance. According to Kalui and Kenyanya (2015), credit risk, mortgage costs, and mortgage information are the main factors hindering mortgage uptake in Kenya.

#### **4.2.2. Descriptive Statistics for Residential Mortgage Mismatch Ratio**

From the secondary data collected, residential mortgage mismatch ratio was determined. Mismatch risk was measured in terms of the ratio between short term bank deposits at the end of every financial year and the total residential mortgages loans and advances at the end of every year. According to the findings presented in Table 4.1, residential mortgage mismatch risk had an average of 0.1194. This suggests that the residential mortgage mismatch risk for public mortgage originators is 11.94%. Findings further revealed a standard deviation of 0.08349 which suggest that the variation of residential mortgage mismatch risk among public mortgage originators is not overly dispersed. This can be confirmed from the coefficient of variation of .69924 which reveals low-variance. The findings further revealed that the skewness for residential mortgage mismatch risk was 0.348. This suggests that the frequency distribution for residential mortgage mismatch risk for public mortgage originators does not significantly deviate away from a normal distribution. The skewness results are furthermore affirmed by the kurtosis

results which reveal a statistic of 0.521 which implies that the distribution for residential mortgage mismatch ratio does not significantly deviate from a normal distribution.

Similarly, Thuo (2018) carried out a study which sought to identify the factors which significantly influence mortgage uptake in Kenya. The study examined the liquidity, asset quality and capital adequacy as its variables. The findings of the study revealed a mean of 1.187388 with a standard deviation of 0.0691094. In the same light, Chiquier, Hassler and Lea (2004) carried out a study which sought to examine mortgage security markets in emerging economies. The study noted that residential mortgage lending remain minimal within emerging markets. Chiquier *et al.* (2004) identify liquidity risk as one of the significant risks faced by mortgage lenders within emerging economies. In the same vein, Wilfred and Otieno (2020) carried out a study which sought to determine the influence of various financial factors on mortgage financing growth in Kenya. The findings of the study revealed that access to finance by mortgage lenders significantly impacts on the growth of mortgage financing in Kenya.

#### **4.2.3. Descriptive Statistics for Residential Mortgage Default Ratio**

Table 4.1 presents the descriptive statistics with reference to residential mortgage default rate. Mortgage default rate was measured using the non-performing loans ratio. The non-performing loans ratio was measured as the ratio of non-performing residential mortgage loans to total residential mortgage loans and advances. From the findings presented in Table 4.1, the mean for residential mortgage default risk was 0.0796 with a standard deviation of 0.04219. This suggests that the average residential mortgage default risk for mortgage loans for publicly listed mortgage originators stands at 7.96%. In addition, the

standard deviation results - 0.04219 – suggest that the variation of residential mortgage default risk among public mortgage originators is not overly dispersed. Thus, residential mortgage default risk is a major concern to all publicly listed mortgage originators.

Findings presented in Table 4.1 further revealed a coefficient of variation of .53002. This suggests that there was a significant level of dispersion of data collected around the mean. Table 4.1 further presents the skewness of the residential mortgage default risk frequency distribution as 0.828. This finding suggests that the frequency distribution for residential mortgage default risk for public mortgage originators does not significantly deviate away from a normal distribution. This is furthermore affirmed by kurtosis results of 0.019 which reveal that residential mortgage default ratio distribution does not significantly deviate from a normal distribution.

Similar findings are echoed through a study carried out by Wambui (2013). The study sought to determine the influence interest rate volatility on mortgage default rate among Kenyan commercial banks. Wambui (2013) reveals that commercial banks have minimal disparity in the mortgage default rate. In the same light, Kipyegon and Matanda (2019) carried out which sought to determine the extent to which a number of factors influence mortgage uptake in Kenya. Among the factors examined through the study was credit risk. The findings of the study revealed a mean and standard deviation of 15.85 and 1.888562 respectively with reference to mortgage default rate by Kenyan commercial banks.

In the same light, Muhia (2018) conducted a study which sought to determine the factors which influence levels of mortgage financing in Kenya. The study examined a number

of factors including mortgage loss rate. Mortgage loss rate was measured in terms of the ratio between non-performing mortgage loans and the mortgage loan book. The findings of the study revealed a mean mortgage default rate of 5.6%, 4.1%, and 6.7% for tier 1 banks, tier 2 banks, and tier 3 banks respectively. The findings further revealed a standard deviation of 7.4%, 3.3%, and 8.9% for tier 1 banks, tier 2 banks, and tier 3 banks respectively.

#### **4.2.4. Descriptive Statistics for Residential Mortgage Price Ratio**

Table 4.1 further presents the mean and standard deviation findings for residential mortgage interest rate as 0.2193 and 0.11195 respectively. This suggests that the average residential mortgage interest rate for residential mortgage loans is 21.93%. The findings further reveal a standard deviation of 0.11195 between the residential mortgage interest rates charged by publicly listed mortgage originators in Kenya. This attributed to the fact that the standard deviation of 0.11195 is the second highest when compared to the other risk indicators of the study. This suggests that there is some form of disparity when it comes to the interest rates charged for residential mortgages by public mortgage originators. The findings further presented in Table 4.1 revealed a coefficient of variation of .51048.

The findings further reveal a skewness of 0.507 with reference to residential mortgage interest rate frequency distribution. This implies that the residential mortgage interest rate frequency distribution does not significantly deviate away from a normal distribution. Furthermore, a kurtosis statistic of -0.149 is revealed for residential

mortgage rates. This implies that the distribution for residential mortgage rates does not significantly deviate from a normal distribution.

Similar findings are propagated through empirical literature. For instance, Merab (2012) carried out a study which sought to determine the influence of mortgage financing on the financial performance of commercial banks in Kenya. The findings revealed commercial banks in Kenya charge an average of 19% interest on mortgages. Similarly, Wambui (2013) conducted a study which sought to examine the relationship between volatility of interest rates and mortgage default rate. Study findings revealed that banks charged an interest rate of between 7.29% and 16.15% for the between 2008 and 2012.

Muguchia (2012) conducted a study which sought to investigate the relationship between mortgage financing growth and flexible interest rates. The findings revealed that the average mortgage lending rate for the study period was 15.398% with a standard deviation of 1.621957. Similarly, Kaberere (2001) conducted a study which focused on mortgage financing particularly residential mortgages in Kenya. According to Kaberere (2001), residential mortgage interest rates could be as high as 32%. In addition, the average mortgages were approximately above 20%. Kaberere (2001) notes that high interest rates had a significant effect on the lender's default rate.

In another study, Murithi (2014) carried out a study which sought to determine the factors which influence Kenya's mortgage interest rates. The findings revealed that the average interest rate charged by mortgage lenders for the period was 17.166%. However, Murithi (2014) study findings revealed results with a high standard deviation



– interest rates – which suggest a high variation in the interest rates charged by different banks which participated in the study.

#### **4.2.5. Descriptive Statistics for Market Returns for Public Mortgage Originators**

From the findings presented in Table 4.1, the mean market returns for public mortgage originators was 0.0905 with a standard deviation of 0.04198. This suggests that the average market return for publicly listed mortgage originators is 9.05%. In addition, the standard deviation results suggests that the variation of market return among public mortgage originators is not overly dispersed. This is confirmed from the coefficient of variation of .46386 which is the lowest level of volatility among the study variables. The Table 4.1 further reveals a skewness of 0.484 for the market return frequency distribution. Consequently, the distribution does not significantly deviate away from a normal distribution. Similarly, the study results reveal a kurtosis statistic of 0.659 which reveals that the data distribution for market returns for publicly listed mortgage originators in Kenya does not significantly deviate away from a normal distribution.

This finding is in line with that of empirical literature. Muiruri (2014) for instance carried out a study in Kenya which sought to determine the relationship between market returns and systematic risk at the NSE. The study identified the mean market returns for the different sectors listed at the NSE. According to Muiruri (2014), the mean and standard deviation of the market returns for institutions listed under the finance and investment sector at the NSE were 0.022 and 0.10 respectively. This implies that the market returns for institutions in the finance and investment sector was 2.2%. In

addition, the standard deviation results suggest that variation of market returns among the NSE listed firms is not overly dispersed.

Similarly, Mwaura *et al.* (2017A) carried out a study which sought to determine the relationship between stock returns and financial risk. The study population consisted of nine banks listed at the NSE. The study collected secondary data for period between the years 2006 to 2015. The findings of the study revealed a mean and standard deviation of 0.0634 and 0.3520 respectively for stock market returns. This implies that the market returns for the nine banks was 6.34%.

#### **4.2.6. Descriptive Statistics for Firm Market Risk for Public Mortgage Originators**

Table 4.1 presents the mean and standard deviation for firm market risk as 1.0594 and 0.78315 respectively. According to Bierman and Smidt (2003), a stock that has a firm market beta of 1 is strongly positively correlated to the market. In this case, the average of firm market betas for public mortgage originators in Kenya was 1.0594. This implies that public mortgage originating firms are more volatile than the market. In particular, 5.94% more volatile than the market. This can be further confirmed from the coefficient of variation of .73923 which is the second highest level of volatility for all the risk indicators. The findings further presented on Table 4.1 reveals a skewness value of 0.409 for firm market risk. This suggests that data relating to firm market risk does not significantly deviate away from a normal distribution. The findings further reveal a value of -.154 for kurtosis. This statistic implies that firm market risk data distribution does not significantly deviate from a normal distribution.

Similarly, Kioko *et al.* (2019) conducted a study in Kenya which sought to determine the relationship between bank financial performance and financial risks. Market risk was utilized as one of measures of financial risks. The findings depicted a mean of 3.5504 for market risk with a standard deviation of 9.3578 for Kenyan commercial banks. In contrast, Muiruri (2014) carried out a study in Kenya which sought to determine the relationship between market returns and systematic risk at the NSE. The findings of the study revealed that the financial and banking segment at the NSE was least volatile when compared with other market segments. In particular, the average market risk for the finance and banking segment was below 1.

#### **4.3. Diagnostic Tests**

In an effort to validate the credibility of the data collected and the panel data model utilized through the study's data collection and analysis processes, diagnostic tests were carried out. The diagnostic tests conducted on the data collected were Hausman Specification Test, Heteroscedasticity test, Autocorrelation test, Multicollinearity test, Normality test, Granger Causality test, and Unit Root Test.

##### **4.3.1. Hausman Test**

The Hausman Specification Test was developed with Jerry Hausman, De-Min Wu, and James Durbin (Baltagi, 2012). The test is conducted to test the presence of predictor variable (endogenous regressors) in a regression equation. Baltagi (2012) asserts that the existence of endogenous regressors violates one of the assumptions of ordinary least squares which states that there should no correlation between the predictor variable and error term. The Hausman Speciation test enabled the study to identify the panel model –

fixed or random effects model – to utilize in the data analysis process. To determine whether to select between a fixed or random effects model, the study adopted a null hypothesis which stated that the study utilizes the random effects model. Table 4.2 presents the results for the Hausman Specification Test.

**Table 4.2: Hausman Fixed and Random Specification Test**

<b>Test Summary</b>	<b>Chi-Square Statistic</b>		<b>Chi-Square Difference</b>	<b>Probability</b>
	42.600		4	0.789
<b>Variable</b>	<b>Fixed</b>	<b>Random</b>	<b>Variable (Different)</b>	<b>Probability</b>
Fallout Risk	.0071262	.0031292	.003997	0.8282
Mismatch Risk	.0005534	.0006196	-.0000662	0.8232
Default Risk	.0152084	.0077877	.0074207	0.6739
Price Risk	.1172206	.0588298	.0583908	0.8684

From the findings presented in Table 4.2,  $\text{Prob} > \chi^2 = 0.789$  was greater than 0.05 for the overall panel model between the study’s independent and dependent variables. Consequently, the null hypothesis was accepted and the alternative hypothesis was rejected. As a result, the Random Effect Panel Model (REM) was utilized to draw inference from the multivariate panel regression model. Similarly,  $\text{Prob} > \chi^2$  values for the respective bivariate models – residential mortgage fallout risk, residential mortgage mismatch risk, residential mortgage default risk, and residential mortgage price risk – were 0.8282, 0.8232, 0.6739, and 0.8684 respectively. All the  $\text{Prob} > \chi^2$  values were greater than 0.05. Consequently, REM was utilized to draw inference from the study’s bivariate panel regression models.

### 4.3.2. Heteroscedasticity Test

Heteroscedasticity is where the variability of an error term variable is not equal across the range of values of a second variable that predicts it (Gujarati, 2011). In addition, presence of heteroscedasticity can meaningfully influence the results from a panel data regression model because it invalidates statistical tests of significance that assume that modelling errors are uncorrelated and uniform – hence that their variances do not vary with the effects being modelled. To determine presence of heteroscedasticity, a heteroscedastic test was carried out. The null hypothesis for this assumption was that there is no heteroscedasticity in the data collected. Table 4.3 presents results for the test of heteroscedasticity.

**Table 4.3: Breusch-Pagan / Cook-Weisberg test for heteroskedasticity**

```
-----+-----  
Ho: Constant variance  
Variables: fitted values of MarketReturn  
chi2(1)      =      0.39  
Prob > chi2  =      0.5334  
-----+-----
```

The Breusch-Pagan / Cook-Weisberg test was utilized to measure the significance levels of heteroscedasticity from the data collected. The findings presented in Table 4.3 reveal that the null hypothesis is accepted. This is attributed to the fact that the p-value was more than 0.05 which implies that there was no statistically significant heteroscedasticity. Consequently, a panel regression model was utilized due to the fact that variance of error terms of the independent variables was constant.

### 4.3.3. Autocorrelation Test

An autocorrelation test was carried out to determine the existence of pattern of error term observations which may affect the regression model applied in the study. Table 4.4 presents the results for the autocorrelation test.

**Table 4.4: Test for Autocorrelation**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.839	.703	.693	.03838	1.942

a. Predictors: (Constant), Price Risk, Fallout Risk, Mismatch Risk, Default Risk

b. Dependent Variable: Market Return

Gujarati (2011) defines autocorrelation or serial correlation as the degree of correlation between values of the same variable across different observations in the data. The Durbin-Watson test was utilized to test for autocorrelation. According to the findings presented in Table 4.4, the Durbin-Watson test statistic for the study was 1.942. Pallant (2005) argues that Durbin-Watson test statistic value ranges between zero and four. Pallant (2005) gives a rule of thumb that Durbin-Watson test statistic values which range between 1.5 and 2.5 have acceptable levels of autocorrelation. Consequently, the study's variables have normal relative levels of autocorrelation.

### 4.3.4. Multicollinearity Test

A multicollinearity test was carried out to determine the correlation between the study's independent variables – residential mortgage fallout risk, residential mortgage mismatch risk, residential mortgage default risk, and residential mortgage price risk. It was necessary to determine the presence of multicollinearity because its presence restricts the

chance to determine the effect of each independent variable on the study's dependent variable. Table 4.5 presents the results for the test of multicollinearity.

**Table 4.5: Test for Multicollinearity**

Model	Collinearity Statistics		
	Tolerance Level	VIF	
	(Constant)		
1	Fall Out Ratio	.878	1.139
	Mismatch Ratio	.805	1.243
	Default Ratio	.626	1.596
	Price Risk	.714	1.400

Multicollinearity was determined using tolerance level and the variance inflation factor (VIF). From the findings, the study's independent variables - fallout risk, mismatch risk, default risk, and price risk – had a tolerance level of above 0.1. According to Pallant (2005), a tolerance level of above 0.1 is acceptable and reflects the lack of presence of significant multicollinearity between a study's independent variables. In addition, a VIF of less than 10 signifies the lack of statistically significant multicollinearity in a given set of data. From the findings, all the study's independent variables have a VIF of less than 10. This implies the lack of significant presence of multicollinearity between the study's independent variables. Consequently, the independent variables of the study have fulfilled and met one of the assumptions of a multiple regression model – there should be no high levels of correlation between the independent variables.

#### **4.3.5. Normality Test**

Gray (2016) argues that normality tests are carried out to ascertain whether or not the standardized residuals are significantly normally distributed. The test for normality in

this case was measured using Kolmogov-Smirnov statistic and the Shapiro-Wilk test. The table 4.6 presents the results for the test for normality using the Kolmogov-Smirnov test.

**Table 4.6: Test of Normality**

	<b>Kolmogorov-Smirnov</b>		
	<b>Statistic</b>	<b>df</b>	<b>Sig.</b>
Fallout Risk	.298	121	.800
Mismatch Risk	.285	121	.707
Default Risk	.229	121	.501
Price Risk	.207	121	.090
Market Return	.227	121	.067

Gray (2016) argues that a sig. value of more than 0.05 for the Kolmogorov-Smirnov test signifies normality in a distribution. From the results presented in Table 4.6 above, the variable fallout risk had a Kolmogorov-Smirnov significance value of 0.800 which suggests that the variable has a normal distribution. The findings presented on Table 4.6 reveal that mismatch risk has a Kolmogorov-Smirnov significance value of 0.707 which suggests that the variable is normally distributed.

The findings further reveal that default risk has a Kolmogorov-Smirnov significance value of 0.501 which implies that the variable is normally distributed. From the findings presented in Table 4.6 above, price risk and market return variables had a Kolmogorov-Smirnov sig value of 0.090 and 0.067 respectively. This is more than .05 which suggests that both price risk and market return have normal distributions. Table 4.7 below presents results from the Shapiro-Wilk test.



**Table 4.7: Test of Shapiro-Wilk Test**

	Shapiro-Wilk		
	Statistic	df	Sig.
Fallout Risk	.457	121	.078
Mismatch Risk	.580	121	.097
Default Risk	.898	121	.079
Price Risk	.929	121	.075
Market Return	.884	121	.064

Gray (2016) postulates that a sig. value of more than 0.05 in the Shapiro-Wilk test reveals that data is normally distributed. On the contrary, a sig. value of below than 0.05 reveals that the data significantly deviates from a normal distribution. From the findings presented on Table 4.7, all the study variables – fallout risk, mismatch risk, default risk, price risk, and market return – have a Shapiro-Wilk sig. value of above 0.05. This suggests that the data for the study variables have normal distributions. The results for the two tests - Kolmogorov-Smirnov and Shapiro-Wilk – reveal that the data variables for the study have normal distribution. Consequently, the data collected fulfills and meets one of the assumptions of panel data regression modeling – residuals should have normal distributions.

#### **4.3.6. Granger Causality Test**

The Granger causality test is a statistical hypothesis test for determining whether one time series is useful for forecasting another (Gujarati, 2011). If probability value is less than any level, then the hypothesis would be rejected at that level. Table 4.8 presents the Granger Causality test results.

**Table 4.8: Granger causality Wald tests**

Equation	Excluded	chi2	df	Prob > chi2
MarketReturn_A	PriceRisk	5.7513	2	0.056
MarketReturn_A	ALL	5.7513	2	0.056
PriceRisk	MarketReturn_A	.47929	2	0.007
PriceRisk	ALL	.47929	2	0.007
MarketReturn_A	DefaultRatio	1.9173	2	0.383
MarketReturn_A	ALL	1.9173	2	0.383
DefaultRatio	MarketReturn_A	1.0186	2	0.016
DefaultRatio	ALL	1.0186	2	0.016
MarketReturn_A	MismatchRatio	3.9919	2	0.136
MarketReturn_A	ALL	3.9919	2	0.136
MismatchRatio	MarketReturn_A	2.0398	2	0.031
MismatchRatio	ALL	2.0398	2	0.031
MarketReturn_A	FallOutRatio	6.302	2	0.597
MarketReturn_A	ALL	6.302	2	0.597
FallOutRatio	MarketReturn_A	1.0318	2	0.043
FallOutRatio	ALL	1.0318	2	0.043

Table 4.8 reveals a p-significant value of 0.056 for the null hypothesis that market return does not Granger cause residential mortgage price risk. Consequently, the null hypothesis is accepted. This is furthermore proved with the p-significant value of 0.007 for the null hypothesis that residential mortgage price risk does not Granger causes market return. Thus, the null hypothesis is rejected.

From the findings presented on Table 4.8, a p-significant value of 0.383 is obtained for the null hypothesis that market return does not Granger cause residential mortgage default risk. Consequently, the null hypothesis is accepted. This is furthermore proved with the p-significant value of 0.016 for the null hypothesis that residential mortgage default risk does not Granger causes market return. For this case, the null hypothesis is rejected.

From the findings presented on Table 4.8, a p-significant value of 0.136 is obtained for the null hypothesis that market return does not Granger cause residential mortgage mismatch risk. Consequently, the null hypothesis is accepted. This is furthermore proved with the p-significant value of 0.031 for the null hypothesis that residential mortgage mismatch risk does not granger causes market return. Therefore, the null hypothesis is rejected.

Table 4.8 further reveals a p-significant value of 0.597 for the null hypothesis that market return does not Granger cause residential mortgage fallout risk. Consequently, the null hypothesis is accepted. This is furthermore proved with the p-significant value of 0.043 for the null hypothesis that residential mortgage fallout risk does not Granger causes market return. Thus, the null hypothesis is rejected.

Based on these findings, the study accepts the alternative hypothesis which states that there is bidirectional relationship between the independent variables – fallout risk, default risk, mismatch risk, and price risk – and dependent variable – market returns of public mortgage originators – of the study. This suggests that the independent variables

of the study have a forecasting effect on the dependent variable of the study. This finding further justifies that data collected for the study is time series panel data.

**4.3.7. Unit Root Test**

The study utilized the Augmented Dickey Fuller (ADF) to test the order of integration of the variables. Gujarati (2011) argues that the statistical properties of a time series data should not change over time. The ADF test relies on rejecting a null hypothesis of unit root (the series are non-stationary) in favor of the alternative hypotheses of stationarity. The ADF technique is based on the McKinnon critical values. In order to ascertain whether the data for the variables was stationary, the study developed four hypotheses. First, data for the variable residential mortgage fallout risk was non-stationary. Table 4.9 below presents the unit test results for the variable fallout risk.

**Table 4.9: Unit root test for Fallout Risk**

-----				
Dickey-Fuller test for unit root		Number of obs		= 120
----- Interpolated Dickey-Fuller -----				
Test	1% Critical	5% Critical	10% Critical	
Statistic	Value	Value	Value	
-----				
Z(t)	-8.719	-3.503	-2.889	-2.579
-----				
MacKinnon approximate p-value for Z(t) = 0.0000				

From the findings presented in Table 4.9, the McKinnon critical value is 0.0000. Consequently, the null hypothesis that data for the variable residential mortgage fallout risk was non-stationary is rejected. This implies that the data relating to residential mortgage fallout risk was stationary. The second hypothesis was that data for the variable residential mortgage mismatch risk was non-stationary. The table 4.10 below

presents the unit test results for the variable residential mortgage mismatch risk. From the findings presented, the McKinnon critical value is 0.0000. Consequently, the null hypothesis that data for the variable residential mortgage mismatch risk is non-stationary is rejected. This implies that the data relating to the variable residential mortgage mismatch risk is stationary.

**Table 4.10: Unit root test for Mismatch Risk**

```

-----
Dickey-Fuller test for unit root                               Number of obs   =       120
                    ----- Interpolated Dickey-Fuller -----
                        Test          1% Critical      5% Critical      10% Critical
                        Statistic      Value           Value           Value
-----
Z(t)                   -10.295         -3.503          -2.889          -2.579
-----
MacKinnon approximate p-value for Z(t) = 0.0000

```

The third hypothesis relating to stationary of data was that data for the variable residential mortgage default risk was non-stationary. Table 4.11 below presents the unit test results for the variable residential mortgage default risk.

**Table 4.11: Unit root test for Default Risk**

```

-----
Dickey-Fuller test for unit root                               Number of obs   =       120
                    ----- Interpolated Dickey-Fuller -----
                        Test          1% Critical      5% Critical      10% Critical
                        Statistic      Value           Value           Value
-----
Z(t)                   -7.499         -3.503          -2.889          -2.579
-----
MacKinnon approximate p-value for Z(t) = 0.0000

```

From the findings presented in Table 4.11, the McKinnon critical value is 0.0000. Consequently, the null hypothesis that data for the variable residential mortgage default

risk was non-stationary is rejected. This implies that the data relating to residential mortgage default risk was stationary. The fourth hypothesis was that data for the variable residential mortgage price risk was non-stationary. Table 4.12 below presents the unit test results for the variable price risk.

**Table 4.12: Unit root test for Price Risk**

```

-----
Dickey-Fuller test for unit root                               Number of obs   =       120
-----
Test                               ----- Interpolated Dickey-Fuller -----
Statistic                          1% Critical      5% Critical      10% Critical
                                   Value              Value              Value
-----
Z(t)                               -10.693          -3.503           -2.889           -2.579
-----
MacKinnon approximate p-value for Z(t) = 0.0000

```

Table 4.12 presents the unit test results for the variable residential mortgage price risk. From the findings presented, the McKinnon critical value is 0.0000. Consequently, the null hypothesis that data for the variable residential mortgage price risk is non-stationary is rejected. This implies that the data relating to residential mortgage price risk is stationary. Table 4.13 below presents the unit test results for the variable market return.

**Table 4.13: Unit root test for Market Return**

```

-----
Dickey-Fuller test for unit root                               Number of obs   =       120
-----
Test                               ----- Interpolated Dickey-Fuller -----
Statistic                          1% Critical      5% Critical      10% Critical
                                   Value              Value              Value
-----
Z(t)                               9.551           3.503            2.889            2.579
-----
MacKinnon approximate p-value for Z(t) = 0.0000

```

Table 4.13 presents the results for the fifth hypothesis which was that data for the variable market return was non-stationary. From the findings, the McKinnon critical value is 0.0000. Thus, the null hypothesis that data for the variable market return is non-stationary is rejected. Based on unit test results presented on Tables 4.9, 4.10, 4.11, 4.12, and 4.13 the data collected relating to the study variables is stationary and hence appropriate for panel data regression analysis without any adjustments.

#### **4.4. Correlation Analysis**

A correlation analysis matrix was utilized to establish the relationships between the study's independent and dependent variables. According to Cohen and Cohen (2010), there are two main techniques of determining correlation: Karl Pearson correlation coefficient, and Spearman's Rank correlation coefficient. Kothari (2004) identifies Karl Pearson Correlation Coefficient as the most commonly used measure of determining the relationship between two variables. Consequently, the study utilized the Karl Pearson's Pearson correlation coefficient to develop its correlation analysis matrix. Sharma (2007) postulates that correlation coefficients range between -1 and +1: perfect negative correlation and perfect positive correlation. In addition, a correlation coefficient of zero reveals no correlation between the two variables being examined. Cohen and Cohen (2012) state that a correlation of between 1 and 0.75 reveals a strong degree of correlation. Additionally, a correlation of between 0.75 and 0.5 is a moderate degree of correlation. In the same light, a correlation coefficient of between 0.5 and 0 reveals a low degree of correlation. Table 4.14 below presents the correlation coefficient findings between the study's independent and dependent variables.

**Table 4.14: Correlations between Study Variables**

		Market Returns
Market Return	Pearson Correlation	1
	Sig. (2-tailed)	
	N	121
Mismatch Risk	Pearson Correlation	.580**
	Sig. (2-tailed)	.000
	N	121
Default Risk	Pearson Correlation	-.734**
	Sig. (2-tailed)	.000
	N	121
Price Risk	Pearson Correlation	-.583**
	Sig. (2-tailed)	.000
	N	121
Fall Out Risk	Pearson Correlation	.452**
	Sig. (2-tailed)	.000
	N	121
Firm Market Beta	Pearson Correlation	-.358**
	Sig. (2-tailed)	.000
	N	121

\*\* . Correlation is significant at the 0.01 level (2-tailed)

\* . Correlation is significant at the 0.05 level (2-tailed)

#### 4.4.1. Correlation between Fallout Risk and Market Returns

According to the findings presented in Table 4.14, there is a low positive correlation of 0.452 between residential mortgage fallout risk and the market returns of public mortgage originators. This suggests that residential mortgage fallout risk and market returns for public mortgage originating firms have a low positive correlation coefficient. This implies that they move in a similar linear direction. This finding is similar to empirical literature. For instance, Kivindu (2016) conducted a study whose findings revealed a low positive correlation of 0.276 between mortgage uptake and mortgage



interest rates. This suggests that interest rates influence mortgage uptake and residential mortgage fallout to a certain extent.

#### **4.4.2. Correlation between Mismatch Risk and Market Returns**

From the findings presented in Table 4.14, there is a moderate positive correlation coefficient of 0.58 between residential mortgage mismatch risk and market returns for publicly listed mortgage originators. This suggests that residential mortgage mismatch risk and market returns for public mortgage originating firms are moderately positively correlated. This implies that they move in a similar linear direction. This suggests and implies that the market returns for public listed mortgage originators are expected to increase when the residential mortgage mismatch risk increases.

In the same vein, Zvi (2012) argues that mismatch between assets and liabilities are a major cause of financial instability in US pension funds. This suggests that residential mortgage mismatch returns significantly influence market returns for mortgage originators. Similarly, Ali and Oudat (2020) carried out a study which sought to determine the relationship between financial performance and financial risk on eighteen banks in Bahrain. The financial risk measures for the study were operating risk, liquidity risk, exchange rate risk, and capital risk. The findings of the study revealed a positive correlation of 0.362 between liquidity risk and return on assets.

In contrast, Kioko, Olweny and Ochieng (2019) carried out a study which sought to determine the relationship between financial risk and the financial performance of Kenyan banks listed at the NSE. One of the measures utilized to measure financial risk

by the study was liquidity risk. The findings of the study revealed a negative correlation of -0.169 between liquidity risk and return on assets.

#### **4.4.3. Correlation between Default Risk and Market Returns**

From the findings presented in Table 4.14, there is a moderate negative correlation coefficient of -0.734 between market return of public listed mortgage originators and residential mortgage default risk. This implies that they move in a different linear direction. This suggests that the market returns for public mortgage originators are expected to decrease when the default rate of residential mortgages increases. Similarly, empirical literature reveals corresponding results. For instance, Masinde (2017) conducted a study whose overall objective was to determine the relationship between the financial performance of commercial banks in Kenya and credit risk. The findings of that study revealed a moderate negative relationship of -0.618 between non-performing loans and bank financial performance.

In the same light, Kioko *et al.* (2019) carried out which sought to determine the relationship between bank performance by Kenyan banks and financial risks. The findings of the study revealed a negative correlation of -0.551 between credit risk and return on asset of Kenyan banks listed at the NSE. In contrast, Mudanya and Muturi (2018) conducted a study whose overall objective was to determine the relationship between Kenyan banks financial performance and financial risk. The findings of the study revealed a moderate positive correlation of 0.661 between credit risk and profitability of commercial banks listed at the NSE.

#### **4.4.4. Correlation between Price Risk and Market Returns**

The findings further presented in Table 4.14 revealed a moderate negative correlation of -0.583 between residential mortgage price risk and market returns for public listed mortgage originators. This suggests that the two study variables – residential mortgage price risk and market returns for public mortgage originating firms – are moderately negatively correlated. This implies that they move in opposite linear directions. This suggests that the market returns for public listed mortgage originators in Kenya are expected to decline if the residential mortgage price risk increases.

Similarly, Kamweru and Ngui (2017) conducted a study which sought to determine the influence of interest rates on the growth of Kenya's real estate sector. Findings revealed that there is a low negative relationship of -0.287 between interest rates and performance of the real estate industry. Similarly, Ngumo (2012) conducted a study whose finding revealed a moderate negative correlation of -0.722 between interest rates and financial performance of mortgage firms. In contrast, Njoki (2014) carried out a study which sought to determine the influence of interest rate on the mortgage default rate among various banks in Kenya. The findings revealed a significant positive correlation between the two variables of  $r = 0.293^{**}$ ,  $P\text{-value} < 0.01$ . Based on the correlation results, residential mortgage interest rates fluctuations significantly influence residential mortgage default rates.

#### **4.4.5. Correlation between Firm Market Risk and Market Return**

From the findings presented in Table 4.14, there is a moderate low negative correlation coefficient of -0.358 between firm market risk and the market returns of public listed

mortgage originators. This suggests that the firm market risk and market returns for public mortgage originating firms have a low negative correlation. This implies that they move in an opposite linear direction. This suggests that the market returns for public mortgage originators are expected to decrease should firm market risk increase.

In the same vein, Kioko *et al.* (2019) carried out a study which sought to determine the relationship between the financial performance of commercial banks in Kenya and financial risk. The findings of the study revealed a negative correlation of -0.552 between market risk and return on asset of Kenyan banks listed at the NSE. Similarly, Karwitha *et al.* (2018) carried out a study which sought to determine the relationship between market returns and market risk. The findings revealed a negative correlation coefficient of -0.593511 between market returns and market risk. In contrast, Mudanya and Muturi (2018) sought to determine the relationship between financial risk and NSE bank financial performance. The findings revealed a positive correlation coefficient of 0.578 between market risk and the profitability of commercial banks in Kenya.

#### **4.5. Bivariate Results**

Bivariate analysis is the examination of the relationship between two variables (Sharma, 2007). Bivariate results reveal the extent, strength, and significance between a study's independent variable and dependent variable. In this case, bivariate results for the study's independent and dependent variables are presented below.

##### **4.5.1. Bivariate Effect of Fallout Risk on Market Returns of Mortgage Originators**

The Table 4.15 below presents the findings in relation to the effect of residential mortgage fallout risk on market returns of publicly listed mortgage originators in Kenya.

**Table 4.15: Panel Model for the relationship between fallout risk and market return**

```

-----
Random-effects GLS regression                Number of obs   =    121
Group variable: panels                      Number of groups =    11

R-sq:  within = 0.1705                      Obs per group: min =    11
                                           avg =    11.0
                                           max =    11
                                           Wald chi2(1)    =    17.62
                                           Prob > chi2     =    0.0000

corr(u_i, X) = 0 (assumed)
-----
MarketReturn |      Coef.   Std. Err.   z   P>|z|   [95% Conf. Interval]
-----+-----
FallOutRatio |   .1564318   .037266   4.20  0.000   .0833918   .2294717
      _cons |   .9183426   .1030281   8.91  0.000   .7164113   1.120274
-----+-----
      sigma_u |   .120678
      sigma_e |   .75920833
      rho |   .02464324   (fraction of variance due to u_i)
-----

```

The findings reveal an R square value of 0.1211 which implies that 12.11% of variation in market returns for listed mortgage originators is explained by the rate of residential mortgage fallout risk. In addition, table 4.15 presents the beta coefficient with reference to the effect of residential mortgage fallout risk on market returns of publicly listed mortgage originators. The findings reveal a beta coefficient of 0.1564318. This implies that a unit change in residential mortgage fallout risk will cause an increase of 0.1564318 in market returns for public mortgage originators.

Table 4.15 further reveals a z value of 4.20 with a p-significance value of .000 which is less than .05. The critical value of Z at 95% confidence interval is +/-1.96. Consequently, a Z tabulated value of 4.20 is in the rejection region and therefore the null

hypothesis should be rejected. Similarly, a p-significance value of less than 0.05 implies that the null hypothesis should be rejected. This suggests that residential mortgage fallout risk has a significant positive effect on the market returns of public mortgage originators. Thus, the finding leads to the rejection of the null hypothesis ( $H_{01}$ ) – residential mortgage fallout risk has no significant effect on market returns of publicly listed mortgage originators in Kenya. Consequently, the alternative hypothesis – residential mortgage fallout risk has a significant effect on the market returns of public mortgage originators is accepted.

Similarly, Kalui and Kenyanya (2015) conducted a study which sought to determine the factors influencing access to mortgage financing. The findings revealed the following as the factors that may cause lack of mortgage uptake: income, credit risk, form of mortgage factor, and accessibility to mortgage information. Kalui and Kenyanya (2015) argue that changes in interest rate can result in mortgage fallout.

In the same vein, Epetimehin and Fatoki (2015) carried out a study which sought to determine the operational risk management measures adopted by financial institutions. The study identified the following as the operational risks that financial institutions face: internal fraud; damage to physical assets; employee safety; external fraud; breaches in client confidentiality; business system failures. Internal controls, corporate governance, and continuous monitoring and control are some of the measures which financial institutions employ to manage operational risks (Epetimehin & Fatoki, 2015). In addition, operational risk management has a positive effect on financial performance of

financial institutions. Empirical literature identifies operational risk as one of the factors which result in fallout risk.

In the same light, Gillet, Hubner and Plunus (2010) conducted a study which sought to determine the effect of operational risk on stock returns. Study findings indicate that internal fraud announcement results in a significant loss market value for a stock. Operational loss can furthermore adversely affect a financial institution's reputation which in turn negatively affects profitability. According to Hyman (2004), operational risk events influence a financial institution's financial standing, risk profile, and reputation.

#### **4.5.2. Bivariate Effect of Mismatch Risk on Market Returns of Mortgage**

##### **Originators**

Table 4.16 presents the regression results between mismatch risk and market returns. The findings reveal an R square value of 0.2579 between residential mortgage mismatch risk and market returns of publicly listed mortgage originators. This suggests that 25.79% of variation in market returns for listed mortgage originators is explained by residential mortgage mismatch risk. Table 4.16 further presents the beta coefficient with reference to the effect of residential mortgage mismatch risk on market returns of publicly listed mortgage originators. The findings reveal a beta coefficient of 1.03338. This implies that a unit change in residential mortgage mismatch risk will cause an increase of 1.03338 in market returns for public mortgage originators.

**Table 4.16: Panel model for relationship between mismatch risk and market return**

```

-----
Random-effects GLS regression                Number of obs   =    121
Group variable: panels                      Number of groups =    11

R-sq:  within = 0.2699                      Obs per group: min =    11
                                           avg =          11.0
                                           max =          11

                                           Wald chi2(1)    =    41.83
corr(u_i, X) = 0 (assumed)                 Prob > chi2     =    0.0000
-----
MarketReturn |      Coef.   Std. Err.   z   P>|z|   [95% Conf. Interval]
-----+-----
MismatchRatio |   1.03338   .1597725   6.47  0.000   .7202319   1.346529
      _cons |   .1999197   .1699695   1.18  0.024  -.1332144   .5330539
-----+-----
      sigma_u |   .10714877
      sigma_e |   .7122727
      rho |   .02212908   (fraction of variance due to u_i)
-----

```

Table 4.16 further reveals a z value of 6.47 with a p-significance value of .000 which is less than .05. The critical value of Z at 95% confidence interval is +/-1.96. Consequently, a Z tabulated value of 6.47 bigger than the critical value and therefore the null hypothesis should be rejected. Similarly, a p-significance value of less than 0.05 implies that the null hypothesis should be rejected. This suggests that residential mortgage mismatch risk has a positive significant effect on the market returns of public mortgage originators. This finding leads to the rejection of the null hypothesis ( $H_{02}$ ) – residential mortgage mismatch risk has no significant effect on market returns of publicly listed mortgage originators in Kenya. Consequently, the alternative hypothesis – residential mortgage mismatch risk has a significant effect on the market returns of public mortgage originators is accepted.



Empirical literature reveals similar findings. For instance, Mukanzi, Mukanzi and Maniagi (2016) carried out a study which sought to determine the relationship between stock returns at the NSE and financial risk. The findings of the study revealed a positive significant relationship liquidity risk and the stock returns. In the same vein, Juma and Atheru (2018) carried out a study in Kenya which sought to determine the extent to which financial risks influence commercial bank performance. The findings revealed a significant positive relationship between return on assets and liquidity risk. In contrast, Babi (2015) conducted a study which sought to determine the influence of financial risks on the relationship between stock returns and earnings. The findings of the study revealed that liquidity risk had an insignificant effect on the relationship between earnings per share and stock return.

Gambacorta and Mistrulli (2004) carried out an investigation which sought to determine the influence of capital on bank lending behavior. The study sampled various banks in Italy. The findings of this study revealed that capital levels significantly influence bank lending decisions. Similarly, Acharya and Richardson (2009) argue that one of significant causes of the 2007-2008 world financial crisis was that financial institutions – banks and mortgage originators – evaded regulatory capital requirements. Financial institutions achieved this by mortgages being repackaged into mortgage-backed securities and thereby reduced capital requirements against their loans (Acharya & Richardson, 2009). Pradhan and Khadka (2017) conducted a study in Nepal which sought to determine the influence of debt financing on bank financial profitability.

According to Pradhan and Khadka (2017), there is a positive relationship between short term debt to total assets and bank profitability.

Mujahid, Zuberi, Rafiq, Sameen and Shakoor (2014) carried out a study which sought to investigate the relationship between bank performance and capital structure. The findings revealed that there is a positive relationship between capital structure and bank performance. Similarly, Musah, Anokye and Gakpetor (2018) carried out a study in Ghana which sought to determine the relationship between commercial bank profitability and interest rate spread. The findings reveal a significant positive relationship between the profitability of banks and interest rate spread. In the same vein, Irungu (2013) studied how bank performance is influenced by interest rate spread. The findings revealed that there is a strong positive relationship between the two variables – interest rate spread and financial performance.

However, empirical literature also gives contrary findings. For instance, Enekwe, Agu and Eziedo (2014) carried out a study which sought to investigate the relationship between financial leverage and financial performance of various firms listed in the Nigerian Stock Exchange. The findings revealed that debt-equity ratio and debt ratio have a negative relationship with return on assets. However, there was a positive relationship between interest coverage ratio and return on assets. In the same vein, Khan and Syed (2013) carried out a study which sought to determine the effect of liquidity risk on bank profitability. The findings of the study revealed that there is a negative relationship between liquidity gap and bank profitability.

Similarly, Shair *et al.* (2019) carried out a study which sought to determine the relationship between bank profitability and financial risk and competition. The findings revealed that competition, insolvency risk, and credit risk had a negative influence on bank profitability. In addition, the findings further revealed that there was a negative relationship between bank profitability and liquidity risk. In the same light, Musembi, Ali and Kingi (2016) carried out a study which sought to determine the extent to which bank performance is influenced by liquidity risk. The findings revealed that capital adequacy had a positive significant effect on the return on assets of commercial banks. In addition, liquidity level had a positive insignificant effect on bank return on assets. Similarly, Mudanya and Muturi (2018) conducted a study which examined the relationship between bank financial performance and financial risk. The findings revealed that increase in liquidity risk, credit risk, and operational risk would result in a significant decrease in bank profitability.

#### **4.5.3. Bivariate Effect of Default Risk on Market Returns of Mortgage Originators**

Table 4.17 below presents the bivariate regression results on the effect of residential mortgage default risk on the market returns of publicly listed mortgage originators. The findings reveal an R square value of 0.3205 between residential mortgage default risk and market returns of publicly listed mortgage originators. This suggests that 32.05% of variation in market returns for publicly listed mortgage originators is explained by residential mortgage default risk. Table 4.17 further presents the beta coefficient with reference to the effect of residential mortgage default risk on market returns of publicly listed mortgage originators. The findings reveal a beta coefficient of -0.4138163. This

implies that a unit change in residential mortgage default risk will cause a decrease of 0.4138163 in market returns for public mortgage originators.

**Table 4.17: Panel Model Modelling for the effect of Default Risk on Market Return**

```

-----
Random-effects GLS regression              Number of obs   =    121
Group variable: panels                    Number of groups =    11

R-sq:  within = 0.4053                    Obs per group:  min =    11
                                           avg =    11.0
                                           max =    11

                                           Wald chi2(1)    =    60.89
corr(u_i, X) = 0 (assumed)                Prob > chi2     =    0.0000
-----

MarketReturn |      Coef.   Std. Err.   z    P>|z|   [95% Conf. Interval]
-----+-----
DefaultRatio |  -.4138163   .0530316   -7.80  0.000   .3098763   .5177563
      _cons |   .5940729   .1059343    5.61  0.000   .3864455   .8017004
-----+-----

      sigma_u |   .12712882
      sigma_e |   .64284269
           rho |   .03763721   (fraction of variance due to u_i)
-----

```

Table 4.17 further reveals a z value of -7.80 with a p-significance value of .000 which is less than .05. The critical value of Z at 95% confidence interval is +/-1.96. Consequently, a Z tabulated value of -7.80 is in the critical region and therefore the null hypothesis should be rejected. Similarly, a p-significance value of less than 0.05 implies that the null hypothesis should be rejected. This suggests that residential mortgage default risk has a significant negative effect on the market returns of public mortgage originators. This finding leads to the rejection of the null hypothesis ( $H_{03}$ ) – Residential mortgage default risk has no significant effect on market returns of publicly listed mortgage originators in Kenya. Consequently, the alternative hypothesis – residential

mortgage default risk has a significant effect on the market returns of public mortgage originators is accepted.

Similarly, Christoph and Ralf (2009) carried out a comparative study in the US and German which sought to determine the relationship between default risk and equity. The findings from their study reveal that firms with high default risk experience lower returns in both the US and Germany. In the same vein, Khan *et al.* (2018) conducted a study in Pakistan which sought to determine the relationship between financial risk and market return. Credit risk was utilized as one of measures of financial risk. The findings of the study revealed a significant negative relationship between credit risk and stock return. Similarly, Mwaura *et al.* (2017) argue that credit risk significantly influences NSE stock returns.

Onchomba, Njeru and Memba (2018) conducted a study whose findings revealed that real estate loans have a positive impact on bank profitability. However, this relationship is significantly impacted by the rate of default risk. Similarly, Ajayi (1992) carried out a study in Nigeria whose findings revealed that default risk significantly influences the financial performance of mortgage firms. The study further revealed the following as some of the factors that influence default risk: borrower's age, market value of property, monthly repayment amounts, annual income of borrower, and loan to value ratio.

In China, Isanzu (2017) conducted a study on China's five largest banks for a period between 2008 and 2014. The findings revealed that non-performing loans significantly impact of bank financial performance. Similar, findings are proposed by Noor and Abdalla (2014) who argues that credit risk significantly influences firm financial

performance. Similarly, Bhattarai (2016) carried out a study in Nepal which sought to determine the influence of credit risk on the financial performance of commercial banks. The findings revealed that non-performing loan ratio has a negative influence of the financial performance of banks

Ariffin and Tafri (2014) carried out a study which sought to examine the relationship between Islamic bank profitability and financial risks. The findings of the study revealed that default risk has a significant negative effect on the profitability of Islamic banks. In the same vein, Folajimi and Dare (2020) conducted a study which sought to examine the relationship between bank performance and credit risk in Nigeria. The findings of the study revealed that loan to deposits ratio, capital adequacy ratio, and non-performing loans have a significant negative impact on the return on capital employed of commercial banks. Similarly, Muriithi, Waweru and Muturi (2016) conducted a study which sought to examine the influence of default risk on the performance of banks. The findings of the study revealed that default risk has a negative effect on bank financial performance.

In contrast, Ntiamoah *et al.* (2014) carried out a study which sought to determine the influence of default loan rate on financial institution financial performance. Study findings revealed a significant positive correlation between profitability and loan default rate. Similarly, Kithinji (2010) carried out a study in Kenya which sought to determine the influence of credit risk management on the financial performance of Kenyan banks. The findings of this study revealed that there was no significant relationship between the level of non-performing loans and bank profitability.

#### 4.5.4. Bivariate Effect of Price Risk on Market Returns of Mortgage Originators

Table 4.18 presents the bivariate regression results on the effect of residential mortgage price risk on the market returns of publicly listed mortgage originators.

**Table 4.18: Panel Model for the effect of Price Risk on Market Return**

```

-----
Random-effects GLS regression              Number of obs   =       121
Group variable: panels                    Number of groups =        11

R-sq:  within = 0.4314                    Obs per group:  min =        11
                                           avg =         11.0
                                           max =         11

                                           Wald chi2(1)    =       98.51
corr(u_i, X) = 0 (assumed)                Prob > chi2     =        0.0000
-----
MarketReturn |      Coef.   Std. Err.    z    P>|z|    [95% Conf. Interval]
-----+-----
PriceRisk    |  -.4539684   .0457379   -9.93  0.000    .3643237   .5436131
   _cons     |   .6151301   .0809337    7.60  0.000    .456503    .7737571
-----+-----
sigma_u      |           0
sigma_e      |   .62855129
rho          |           0   (fraction of variance due to u_i)
-----

```

According to Table 4.18, the findings reveal an R square value of 0.4529 between residential mortgage price risk and market returns of publicly listed mortgage originators. This suggests that 45.29% of variations of market returns for publicly listed mortgage originators is influence by residential mortgage price risk. Table 4.18 presents the beta coefficient with reference to the effect of residential mortgage price risk on market returns of publicly listed mortgage originators. The findings reveal a beta coefficient of -0.4539684. This implies that a unit change in residential mortgage price

risk will cause a decrease of 0.4539684 in market returns for public mortgage originators.

Table 4.18 reveals a z value of -9.93 with a p-significance value of .000 which is less than .05. The critical value of Z at 95% confidence interval is +/-1.96. Consequently, a Z tabulated value of -9.93 lessor than the critical value and therefore the null hypothesis should be rejected. Similarly, a p-significance value of less than 0.05 implies that the null hypothesis should be rejected. This suggests that price risk has a significant negative effect on the market returns of public mortgage originators in Kenya. This finding leads to the rejection of the null hypothesis ( $H_{04}$ ) – residential mortgage price risk has no significant effect on market returns of publicly listed mortgage originators. Consequently, the alternative hypothesis – residential mortgage price risk has a significant effect on the market returns of public mortgage originators in Kenya is accepted.

Empirical literature further explores the relationship between interest rates and market return. For instance, Mbulawa (2015) carried out a study which studied times series data from the year 1980 to 2008. The findings of the study revealed that there is a relationship between stock market performance and interest rates. Coleman (2008) studied the influence of macroeconomic factors on stock market performance. The findings revealed that the inflation rate, exchange rate and interest rate significantly influence stock market performance. Oyedele (2017) argues that a rise in interest rates will negatively affect stock market performance. For financial institutions, a rise in interest rate will result in better performance (Oyedele, 2017). In contrast, Avallone



(2017) notes that current world stock prices are rising despite global instability, stock market correction, and rising interest rates.

In the same vein, Kavwele, Ariemba and Evusa (2018) conducted a study which sought to determine the relationship between interest rate capping and bank performance. The findings of the study revealed a negative relationship between interest rate capping and bank performance. In the same light, Kihara and Mwangi (2017) conducted a study which sought to determine the relationship between interest rates and financial performance of banks. The findings revealed that lending interest rates has a significant positive effect on bank financial performance. On the contrary, deposit interest rate has a negative effect on bank profitability and performance. Similarly, Ahmed *et al.* (2018) conducted a study which sought to determine the influence of fluctuations of interest rates on the financial performance of banks. The findings for the study revealed that there is a negative relationship between interest rate fluctuations and bank profitability.

Lagat and Okendo (2016) carried out a study which sought to determine the influence of interest rate volatility on the financial performance of banks. The findings revealed a weak positive relationship between fluctuations of bank interest rate and financial performance. Similarly, Ayub and Masih (2013) carried out a study whose findings revealed that there is no significant relationship between interest rates and Islamic bank stock prices. Similarly, Mugambi and Okech (2016) conducted a study in Kenya which sought to determine the relationship between bank stock returns and macroeconomic variables. The study findings revealed that there is a significant negative relationship between bank stock returns and interest rates. Mugambi and Okech (2016) attribute this

to the fact that interest rate fluctuations have a negative effect on bank profitability which subsequently affects bank stock returns.

In the same vein, Macharia (2013) conducted a study which sought to determine the extent to which the financial performance of banks offering mortgage financing were influenced by the global financial crisis. The findings of the study revealed that a unit rise in interest rate will result in a financial performance decrease of 0.425 by banks offering mortgage products. In contrast, Ngumo (2012) carried out a study whose findings revealed that mortgage interest rates have a positive significant effect on bank profitability. However, Ngumo notes that high mortgage interests positively influence bank profitability to a certain point; after which they can discourage borrowings. Similarly, Tran (2013) carried out a study whose findings revealed that interest rate volatility significantly influences bank stock returns and performance. In particular, long-term interest rates and returns of bank ordinary stocks are correlated positively.

Mিনny and Gormus (2017) carried out a study which sought to determine the influence of interest rate fluctuations on the profitability of banks. Findings revealed that there is a positive relationship between interest rate volatility and the performance of financial institutions. Similarly, Abdulrehman and Nyamute (2018) carried out a study which sought to find the influence of mortgage finance on bank performance. Findings revealed that there is a positive significant relationship between bank financial performance and interest rate charged.

## 4.6. Moderated Bivariate Results

This section reveals the bivariate moderated results between the independent and dependent variables of the study.

### 4.6.1. Bivariate Moderated effect of Fallout Risk on Market Returns

Table 4.19 below presents the bivariate moderated results between fallout risk and the market returns of publicly listed mortgage originators.

**Table 4.19: Bivariate moderated results between fallout risk and market return**

```

-----
Random-effects GLS regression           Number of obs   =    121
Group variable: panels                 Number of groups =     11

R-sq:  within = 0.0755                 Obs per group:  min =     11
                                     avg =    11.0
                                     max =     11
                                     overall = 0.0486

                                     Wald chi2(1)    =     6.25
corr(u_i, X) = 0 (assumed)            Prob > chi2     =    0.0124
-----
MarketReturn |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----+-----
  fallout_mod |   .0354735   .0141872    2.50  0.012   .0076672   .0632799
    _cons     |   1.089374   .0869095   12.53  0.000   .9190343   1.259713
-----+-----
      sigma_u |   .06090762
      sigma_e |   .80150506
          rho |   .00574156   (fraction of variance due to u_i)
-----

```

From the findings presented on Table 4.19, there is an R square of 0.0486 between moderated fallout risk and market returns of mortgage originators. Consequently, the moderating effect of firm market risk results in a variation decrease of 7.25% between fallout risk and the market returns of publicly listed mortgage originators. This is

attributed to fact that the bivariate R square result between residential mortgage fallout risk and market returns – as presented in Table 4.15 – is 0.1211.

The findings further presented on Table 4.19 above reveal a beta coefficient of 0.0354735 which implies that a unit change of fallout risk will result in an increase of 0.0354735 in the market returns of public mortgage originators. The findings further reveal a z value of 2.5 with a p-significant value of 0.012 which is less than .05. This suggests that there is a significant moderating effect of mortgage originator firm market risk on the effect of residential mortgage fallout risk on the market returns of public mortgage originators.

These results suggest whereas fallout risk has a direct impact on market return, the effect is reduced by the level of firm market risk. This is critical due to the fact that idiosyncratic residential mortgage fallout risk depends on mortgage characteristics but cannot work independent of the market. This is in line with the EMH theory which asserts that pricing of securities is a function of market risk for a well-diversified portfolio. Consequently, mortgage originators need to assess market risk as they evaluate residential mortgage fallout risk.

#### **4.6.2. Bivariate Moderated effect of Mismatch Risk on Market Returns**

Table 4.20 below presents the bivariate moderated results between residential mortgage mismatch risk and market returns.

**Table 4.20: Bivariate moderated results between mismatch risk and market return**

```

-----
Random-effects GLS regression                Number of obs    =    121
Group variable: panels                      Number of groups =    11

R-sq:  within = 0.2663                      Obs per group:  min =    11
                                           avg =    11.0
                                           max =    11

                                           Wald chi2(1)     =    37.64
corr(u_i, X) = 0 (assumed)                 Prob > chi2      =    0.0000
-----
MarketReturn |      Coef.   Std. Err.   z   P>|z|   [95% Conf. Interval]
-----+-----
mismatch_mod |   .2297066   .0374392   6.14  0.000   .1563272   .3030861
      _cons |   .9410618   .088753   10.60  0.000   .7671091   1.115014
-----+-----
      sigma_u |   .14484103
      sigma_e |   .71401895
      rho |   .03952307   (fraction of variance due to u_i)
-----

```

Table 4.20 reveals an R square of 0.2300 between moderated residential mortgage mismatch risk and market returns of publicly listed mortgage originators. In this case, residential mortgage mismatch risk has been moderated with firm market risk which was measured using firm market beta. Consequently, the moderating effect of firm market risk on residential mortgage mismatch risk is 2.79% (a decrease from 0.2579 to 0.2300). These findings are in contrast to that of empirical literature. Njogo, Simiyu and Waithaka (2017) for instance carried out a study which sought to determine the relationship between stock returns and equity risk factors at the NSE. The study collected secondary data for the period between 2009 and 2014 from 45 firms listed at the NSE. Market risk in this case was measured using the difference between market

return and risk free rate. The findings revealed that market risk has a significant positive effect on the stock returns of firms listed at the NSE.

Table 4.20 further reveals a beta coefficient of 0.2297066. This suggests that a unit change of mismatch risk will result in an increase of 0.2297066 in the market returns of public mortgage originators. In addition, the findings revealed a z value of 6.14 with a significant value of 0.000 which is less than .05. This suggests that there is a significant moderating effect of mortgage originator firm market risk on the effect of residential mortgage mismatch risk on the market returns of public mortgage originators.

#### **4.6.3. Bivariate Moderated effect of Default Risk on Market Returns**

Table 4.21 below presents the bivariate moderated results between default risk and the market returns of publicly listed mortgage originators. According to Table 4.21, there is an R square of 0.1536 between moderated residential mortgage default risk and market returns of publicly listed mortgage originators. Moderated residential mortgage default risk has been moderated using firm market beta. From the findings presented, the moderating effect of firm market risk results in a decrease variation of 16.69% between residential mortgage default risk and the market returns of publicly listed mortgage originators. This is attributed to fact that the bivariate R square result between residential mortgage default risk and market returns of publicly listed mortgage originators– as presented in Table 4.17 – is 0.3205.

**Table 4.21: Bivariate moderated results between default risk and market return**

```

-----
Random-effects GLS regression                Number of obs    =    121
Group variable: panels                      Number of groups =    11

R-sq:  within = 0.1407                      Obs per group:  min =    11
                                           avg =    11.0
                                           max =    11

                                           overall = 0.1536

                                           Wald chi2(1)    =    21.60
corr(u_i, X) = 0 (assumed)                 Prob > chi2     =    0.0000
-----
MarketReturn |      Coef.   Std. Err.   z   P>|z|   [95% Conf. Interval]
-----+-----
default_mod |  -.0819192   .0176258   -4.65  0.000   .0473732   .1164653
   _cons |   1.052675   .0760893   13.83  0.000   .9035423   1.201807
-----+-----
sigma_u |           0
sigma_e |   .7727252
rho |           0   (fraction of variance due to u_i)
-----

```

Table 4.21 further reveals a beta coefficient of -0.0819192. This implies that a unit change of default risk will result in a decrease of 0.0819192 in the market returns of public mortgage originators in Kenya. The findings further presented on Table 4.21 reveal a z value of 4.65 with a p-significant value of 0.000 which is less than .05. This implies that there is a significant moderating effect of mortgage originator firm market risk on the effect of residential mortgage default risk on the market returns of public mortgage originators.

#### 4.6.4. Bivariate Moderated effect of Price Risk on Market Returns

Table 4.22 below presents the bivariate moderated results between price risk and market returns of publicly listed mortgage originating firms.

**Table 4.22: Bivariate moderated results between price risk and market return**

```

-----
Random-effects GLS regression                Number of obs    =    121
Group variable: panels                      Number of groups =    11

R-sq:  within = 0.4883                      Obs per group:  min =    11
                                           avg =    11.0
                                           max =    11
                                           overall = 0.4432

                                           Wald chi2(1)     =    100.02
corr(u_i, X) = 0 (assumed)                 Prob > chi2      =    0.0000
-----
MarketReturn |      Coef.   Std. Err.    z    P>|z|    [95% Conf. Interval]
-----+-----
    price_mod |   -.2185367   .0218518   -10.00  0.000    .1757079   .2613656
         _cons |    .8469484   .0764642    11.08  0.000    .6970814   .9968154
-----+-----
    sigma_u |   .13116831
    sigma_e |   .59628042
         rho |   .0461566   (fraction of variance due to u_i)
-----

```

Table 4.22 reveals an R square of 0.4432 between moderated price risk and market returns of publicly listed mortgage originators. In this case, residential mortgage price risk has been moderated using firm market risk which was calculated using market beta. From the findings, the moderating effect of firm market risk results in a decrease variation of 0.97% between price risk and the market returns of publicly listed mortgage originators. This is attributed to fact that the bivariate R square result between price risk and market returns – as presented in Table 4.18 – is 0.4529.

Table 4.22 reveals a beta coefficient of -0.2185367 which suggests that a unit change in price risk will result in a decrease of .2185367 of the market returns of public mortgage originators. The findings further reveal a z-value of -10.00 with a p-significant value of



0.000 which is less than .05. This suggests that there is a significant moderating effect of mortgage originator firm market risk on the effect of residential mortgage default risk on the market returns of mortgage originators.

Residential mortgage price risk effect on the stock market is negatively moderated by the market firm risk as shown in Table 4.22. However, the magnitude of the effect falls from a coefficient of -0.4529 in the unmoderated version of the effect in table 4.18 to -0.2185 in the moderated version in table 4.22. This implies that despite the poor portfolio diversification by the mortgage originators, the residential mortgage price risk is somehow protected by the mortgage contracts such that whereas there is a negative moderating effect of the idiosyncratic risk, the effect is not very enhanced.

#### **4.7. Multivariate Results**

Table 4.23 presents the multivariate regression results of the effect of mortgage risk – residential mortgage fallout risk, residential mortgage mismatch risk, residential mortgage default risk, and residential mortgage price risk – on the market returns of public mortgage originators in Kenya. The findings reveal an R square value of 0.5570 between mortgage risk and market returns of publicly listed mortgage originators. This suggests that 55.7% of variation in market returns for publicly listed mortgage originators listed at the NSE is influence by residential mortgage fallout risk, residential mortgage mismatch risk, residential mortgage default risk, and residential mortgage price risk.

Empirical literature shed light on the relationship between mortgage financing and the financial performance of mortgage originators. For instance, Adongo (2012) carried out

a study in Kenya which sought to examine the relationship between the financial performance of banks and mortgage financing. Study findings revealed a strong positive relationship between bank financial performance and mortgage financing. In the same vein, Merab (2012) conducted a study whose findings revealed mortgage financing significantly and positively impacted the financial performance of commercial banks in Kenya.

**Table 4.23: Panel Model between independent variables and market return**

```

-----
Random-effects GLS regression              Number of obs   =    121
Group variable: panels                    Number of groups =     11

R-sq:  within = 0.5446                    Obs per group:  min =     11
                                           avg =    11.0
                                           max =     11
                                           Wald chi2(4)    =    145.87
                                           Prob > chi2     =     0.0000

corr(u_i, X) = 0 (assumed)
-----
MarketReturn |      Coef.   Std. Err.   z   P>|z|   [95% Conf. Interval]
-----+-----
MismatchRatio |   .6445824   .133436   4.83  0.000   .3830526   .9061121
FallOutRatio  |   .0011241   .0053834   0.21  0.054  -.0094272   .0116753
DefaultRatio  |  -.0472512   .0224913  -2.10  0.036   .0031692   .0913333
  PriceRisk   |  -.3666275   .0449532  -8.16  0.000   .2785209   .454734
      _cons   |   .0378465   .1352271   0.28  0.007  -.2271938   .3028867
-----+-----
      sigma_u |           0
      sigma_e |   .56996369
           rho |           0   (fraction of variance due to u_i)
-----

```

On the contrary, Odhiambo (2015) conducted a study which sought to determine the relationship between real estate financing and commercial bank financial performance in Kenya. The findings of the study revealed that real estate financing does not influence

bank profitability. Similarly, Dondi and Ouma (2017) carried out study in Kenya which sought to determine the relationship between commercial bank financial performance and mortgage lending volumes. The findings of the study revealed that there was a significant negative correlation between mortgage volume and return on assets, return on equity, and net interest margin. According to Dondi and Ouma (2017), there is a weak significant negative relationship between bank financial performance and mortgage lending volume.

Table 4.23 presents the beta coefficient of 0.0011241 with reference to the effect of residential mortgage fallout risk on the market returns of public mortgage originators. This implies that a unit change in residential mortgage fallout risk will result in an increase of 0.0011241 in market returns for public mortgage originators. In addition, Table 4.23 reveals a z value of 0.21 with a p-significance value of 0.054. This suggests that residential mortgage fallout risk has a partial significant effect on the market returns of public mortgage originators. This result is in line with the bivariate results between residential mortgage fallout risk and market returns of public mortgage originators as presented in Table 4.15. Bivariate results reveals a z value of 4.20 with a p-significance value of .000 which is less than .05.

From empirical literature, Nyanyuki and Omar (2016) carried out a study which sought to identify elements which affect mortgage lending by financial institutions. Findings revealed mortgage lending improved bank profitability. In addition, mortgage costs significantly influence mortgage lending thus affect bank profitability. Similarly, Akenga, Olang and Galo (2015) carried out a study which sought to determine the

influence of mortgage market risk on Kenya's mortgage uptake. Mortgage market risk measures included: liquidity risk, price risk interest rate risk and price risk. The findings revealed that 70% of variations in mortgage uptake was explained by study variables. Consequently, residential mortgage fallout significantly influences mortgage originator financial performance and market return.

Table 4.23 further presents a beta coefficient of 0.6445824 between residential mortgage mismatch risk and market returns of public mortgage originators. This implies that a unit change in residential mortgage mismatch risk will result in an increase of 0.6445824 in market returns for public mortgage originators. Table 4.23 further reveals a z value of 4.83 with a p-significance value of 0.000 which is less than .05. This suggests that residential mortgage mismatch risk has a significant positive effect on the market returns of public mortgage originators. This result is in line with bivariate results between residential mortgage mismatch risk and market return of public mortgage originators as presented in Table 4.16. Bivariate results reveal a z value of 6.47 with a p-significance value of .000 which is less than .05.

Empirical literature presents similar findings with reference to the relationship between mismatch risk and market returns. For instance, Mukanzi *et al.* (2016) carried out a study in Kenya which sought to determine the relationship between stock returns at the NSE and financial risk. The findings of the study revealed that there was a positive significant relationship liquidity risk and the stock returns. Similarly, Mujahid *et al.* (2014) carried out a study whose findings revealed that there is a positive relationship between capital structure and bank performance. In contrast, Babi (2015) conducted a study which

sought to determine the influence of financial risks on the relationship between stock returns and earnings. Financial risk was measured using solvency credit, and liquidity risk. The findings of the study revealed that liquidity risk had an insignificant effect on the relationship between earnings per share and stock return. In the same vein, Mudanya and Muturi (2018) conducted a study whose findings revealed that increase in liquidity risk, credit risk, and operational risk would result in a significant decrease in bank profitability.

According to Table 4.23, there is a beta coefficient of -0.0472512 between residential mortgage default risk and the market returns of public mortgage originators. This implies that a unit change in residential mortgage default risk will result in a decrease of 0.0472512 in market returns for public mortgage originators. In addition, Table 4.23 reveals a z value of -2.10 with a p-significance value of 0.036 which is less than .05. This suggests that residential mortgage default risk has a significant negative effect on the market returns of public mortgage originators. This result is in line with bivariate results between residential mortgage default risk and market returns of public mortgage originators as presented on Table 4.17. Bivariate results reveal a z value of -7.80 with a p-significance value of .000 which is less than .05.

In the same vein, Khan *et al.* (2018) conducted a study in Pakistan which sought to determine the relationship between financial risk and market return. Financial risk was measured with reference to: liquidity risk and credit risk. The findings of the study revealed a significant negative relationship between credit risk and stock return. On the contrary, the findings revealed that there was a significant positive relationship between

liquidity risk and stock return. Similarly, Gharghori, *et al.* (2009) carried out a study in Australia which sought to examine the relationship between equity returns and default risk. The findings revealed a negative relationship between default risk and equity returns. In the same vein, Christoph and Ralf (2009) carried out a comparative study in the US and German which sought to determine the relationship between default risk and equity. The findings from their study reveal that firms with high default risk experience lower returns in both the US and Germany.

In Kenya, Mwaura *et al.* (2017) carried out a study which sought to determine the relationship between market return and credit risk. The findings revealed a significant negative relationship between non-performing loans ratio and stock returns. Mwaura *et al.* (2017) argue that credit risk significantly influences NSE stock returns. In contrast, Chava and Purnanandam (2010) argue that although there is a positive relationship between default risk and stock returns; returns are usually lower than the expected returns.

The findings presented in Table 4.23 further reveals a beta coefficient of -0.3666275 between residential mortgage price risk and the market returns of public mortgage originators in Kenya. This implies that a unit change in residential mortgage price risk will result in a decrease of 0.3666275 in market returns for public mortgage originators. Table 4.23 further reveals a z value of -8.16 with a p-significance value of .000 which is less than .05. This suggests that residential mortgage price risk has a significant negative effect on the market returns of public mortgage originators. This result is in line with bivariate results between residential mortgage price risk and market returns of public

mortgage originators as presented on Table 4.18. Bivariate results reveal a z value of -9.93 with a p-significance value of .000 which is less than .05.

Empirical literature reveals similar findings. Mugambi and Okech (2016) for instance conducted a study in Kenya which sought to determine the relationship between bank stock returns and macroeconomic variables. The study findings revealed that there is a significant negative relationship between bank stock returns and interest rates. Mugambi and Okech (2016) attribute this to the fact that interest rate fluctuations have a negative effect on bank profitability which subsequently affects bank stock returns.

In contrast, Ayub and Masih (2013) carried out a study whose findings revealed that there is no significant relationship between interest rates and Islamic bank stock prices. Similarly, Tran (2013) carried out a study whose findings revealed that interest rate volatility significantly influences bank stock returns and performance. In particular, long-term interest rates and returns of bank ordinary stocks are correlated positively.

#### **4.8. Multivariate Moderated Results between Mortgage Risk and Market Return**

Table 4.24 presents the results with reference to the moderating effect of firm market risk on the effect of mortgage risk on the market returns of publicly listed mortgage originators in Kenya. From the findings presented in Table 4.24, there is an R square value of 0.4512 between mortgage risk and market returns of publicly listed mortgage originators with the moderator being firm market beta. This suggests that 45.12% of variations in market returns for publicly listed mortgage originators are influenced by fallout risk, mismatch risk, default risk, and price risk with firm market risk being the moderator. Consequently, the moderating effect of firm market risk results in a decrease

variation of 10.58% between mortgage risk and the market returns of publicly listed mortgage originators. This is attributed to fact that the multivariate R square result between mortgage risk and the market returns of publicly listed mortgage originators – as presented in Table 4.23 – is 0.5570.

**Table 4.24: Multivariate moderated results between mortgage risk and market return**

```

-----
Random-effects GLS regression                Number of obs    =    121
Group variable: panels                      Number of groups =     11

R-sq:  within = 0.5005                      Obs per group:  min =     11
                                           avg =     11.0
                                           max =     11

                                           Wald chi2(4)     =    102.37
corr(u_i, X) = 0 (assumed)                 Prob > chi2      =     0.0000
-----
MarketReturn |      Coef.   Std. Err.   z   P>|z|   [95% Conf. Interval]
-----+-----
mismatch_mod |  -.4602833   .1260116   -3.65  0.000   .2133051   .7072616
  fallout_mod |   .003966    .0069562    0.57  0.569   -.0096678   .0175998
  default_mod |  -.1941005   .0437773   -4.43  0.000   -.1082986   .2799024
    price_mod |  -.2320597   .0377854   -6.14  0.000   .1580016   .3061178
      _cons   |   .8286021   .0856558    9.67  0.000   .6607199   .9964843
-----+-----
      sigma_u |   .15186752
      sigma_e |   .59730073
        rho   |   .06072092   (fraction of variance due to u_i)
-----

```

The findings further presented on Table 4.24 reveal a Prob > Chi2 value of 0.000 which suggests that firm market risk has a significant moderating effect on the effect of mortgage risk on the market returns of publicly listed mortgage originators in Kenya. Consequently, the null hypothesis that there is no significant moderating effect of



mortgage originator firm market risk on the effect of mortgage risk on market returns of publicly listed mortgage originators in Kenya is rejected. Consequently, the alternative hypothesis – mortgage originator firm market risk has a significant moderating effect on the effect of mortgage risk on the market returns of public mortgage originators in Kenya – is accepted.

The findings further presented in Table 4.24 reveal beta coefficients of -0.2320597, 0.003966, -0.1941005, and -0.4602833 for residential mortgage price risk, residential mortgage fallout risk, residential mortgage default risk, and residential mortgage mismatch risk respectively. This suggests that price risk has the most significant effect when compared to the other independent variables of the study on the market returns of public mortgage originators with the moderator being firm market risk.

Table 4.24 reveals significance values of .000, .000, and .000, for moderated mismatch, default, and price risk respectively. All the p-values for the three variables are less than .05. This suggests that firm market beta has a significant moderating effect on the relationship between mismatch risk, default risk, price risk and the market returns of public mortgage originators. However, fallout risk has a significance value of .569 which implies that it has an insignificant effect.

From table 4.24 the following become evident. Firstly, firm market risk as indicated by beta has a negative moderating effect on the relationship between residential mortgage mismatch risk and market return of mortgage originators in Kenya. This can be compared to the direct multivariate effect in table 4.23 in which mismatch risk had a positive effect on market return within a joint set-up with the rest of the risk factors.

Introducing firm market risk reverses the direction of the effect. The implication is that mortgage originators do not have fully diversified mortgage portfolios and that mismatch risk when evaluated alongside the level of mortgage portfolio diversification does in fact negatively affect returns. This is in line with portfolio theory of Markowitz (1952) and the capital asset pricing models in which risk is a negatively priced information item in the absence of a well-diversified portfolio.

Secondly, residential mortgage fallout risk influence on market returns is not moderated by the level of market return as indicated a statistically insignificant coefficient value based on both z and p-values in table 4.24. This is consistent with the unmoderated findings in table 4.23 which also revealed that residential mortgage fallout ratio is not a priced risk factor in the stock market by the market originators. This is indicative of the fact that mortgage applicants who do not fall through with their loans once they start the borrowing process may be statistically insignificant. This portrays a situation in Kenya where very few individuals develop their real estate based on mortgages and that mortgage originators have stringent loan approval rules that only favour those with stable incomes and valuable real estate collateral. The end result of this is that the possibility of fallout is reduced to the minimum and that the undiversified mortgage portfolio as indicated in the findings under the mismatch risk are biased to the financially stable borrowers that are unlikely to fallout once the mortgage origination process has been initiated. This again is consistent with portfolio theory of Markowitz (1952) and the factor pricing models where fully diversified risk is not a priced factor in

the stock market. This is in line with Odhiambo (2015) who show that real estate financing in general hardly affects the performance of commercial banks in Kenya.

Thirdly, table 4.23 indicated that residential mortgage default risk is a negatively priced factor of mortgage originators in the stock market. This is enforced by table 4.24 that indicates that market risk has a negative moderating effect on how residential mortgage default risk of mortgage originators is priced by the stock market. This again is consistent with the biased mortgage portfolios of mortgage originators who seem not to have fully diversified portfolios contrary to expectations of Markowitz (1952) in his portfolio theory. This is partly attributable to the stringent origination rules and partly because of insistence on lending to particular classes of borrowers especially those with valuable real estate collateral and stable incomes. This leaves a significant undiversified idiosyncratic risk which exacerbates the moderating effect of this idiosyncratic risk on how the market negatively prices the resultant default risk. Again this clearly supports the portfolio theory that points to the fact that less than a well-diversified portfolio leaves residual unsystematic risk that affects the risk and return profile of an entity, in this case mortgage originators.

Finally, residential mortgage price risk pricing effect on the stock market is negatively moderated by the market firm risk as shown in table 4.24. However, the magnitude of the effect falls from a coefficient of -0.36 in the multiple unmoderated version of the effect in table 4.23 to -0.23 in the moderated version in table 4.24. This implies that despite the poor portfolio diversification by the mortgage originators, the residential mortgage price risk is somehow protected by the mortgage contracts such that whereas

there is a negative moderating effect of the idiosyncratic risk, the effect is not very enhanced. In Kenya, the potential of significant rate changes over the study period were often times affected by the regulation of the interest rates in the market and that the rate spread among the various market mortgage originators is not very enhanced since most of them use the regulator rates (CBK rates) as the benchmark rates for setting the mortgage origination rate, the status of the qualifying mortgage applicants having been taken into consideration. Akenga et al. (2015) had indicated the relative stable level in the mortgage interest rates in Kenya.

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter presents a summary of analyzed findings with the aim of drawing conclusions. Based on the conclusions arrived at, this chapter make recommendations with reference to the objectives of the study and the statement of the problem. This chapter is divided into the following subsections: summary of findings, conclusion, recommendations of the study, and recommendations for further studies.

#### 5.2 Summary of Findings

##### 5.2.1 Effect of residential mortgage fall out risk on market return of public mortgage originators

Fallout risk refers to the risk that a potential mortgage borrower fails or withdraws from completing their loan mortgage transaction (Kolb & Overdahl, 2010). Taff (2003) defines fallout risk as the possibility that a potential mortgage borrower does not close on their approved loan application. From the data collected, the average residential mortgage fallout risk rate for the publicly listed mortgage originators was 9.76% with a standard deviation of 0.08453. This implies that the variation of residential mortgage fallout risk among public mortgage originators is not overly dispersed. The findings further revealed a coefficient of variation of .86608. In addition, the level of skewness for fallout risk was 0.093. Consequently, the frequency distribution for residential mortgage fallout risk does not deviate to a great extent away from a normal distribution.

The findings further revealed a positive correlation coefficient of 0.452 between residential mortgage fall out risk and market returns of public mortgage originators. The findings reveal an R square value of 0.1211 between residential mortgage fallout risk and market returns of publicly listed mortgage originators. This suggests that 12.11% of variation in market returns for listed mortgage originators is explained by the rate of residential mortgage fallout risk. The findings further revealed a beta coefficient of 0.1564318. This implies that a unit change in residential mortgage fallout risk will cause an increase of 0.1564318 in market returns for public mortgage originators. In addition, the findings revealed a Z value of 4.20 with a p-significance value of .000 which is less than .05. This suggests that residential mortgage fallout risk has a significant positive effect on the market returns of public mortgage originators. Based on these findings, the null hypothesis ( $H_{01}$ ) residential mortgage fallout risk has no significant effect on market returns of publicly listed mortgage originators in Kenya is rejected.

The findings further reveal that firm market risk has a significant moderating effect on the relationship between residential mortgage fallout risk and market returns of listed mortgage originators. In particular, firm market risk results in a variation decrease of 7.25% between the relationship between residential mortgage fallout risk and the market returns of publicly listed mortgage originators.

### **5.2.2 Effect of residential mortgage mismatch risk on market return of public mortgage originators**

Cornyn, Cornyn and Mays (1997) defines mismatch risk as the uncertainty of income as a consequence of difference in maturity periods of liabilities, assets, and off-balance

sheet instruments. According to Li and Zhang (2017), maturity mismatch describes disparities between fund sources and funds use which could result in default and liquidity challenges. From the findings, the average residential mortgage mismatch risk for public mortgage originators is 11.94% with a standard deviation of 0.08349. This suggest that the variation of residential mortgage mismatch risk among public mortgage originators is not overly dispersed. Findings further revealed a coefficient of variation of .69924. In addition, the skewness for residential mortgage mismatch risk was 0.348. Thus, the frequency distribution for mismatch risk does not significant deviate away from a normal distribution.

The findings revealed a positive correlation coefficient of 0.580 between residential mortgage mismatch risk and market returns for publicly listed mortgage originators. The findings also revealed an R square value of 0.2579 between residential mortgage mismatch risk and market returns of publicly listed mortgage originators. This suggests that 25.79% of variation in market returns for listed mortgage originators is explained by residential mortgage mismatch risk. In addition, the findings reveal a beta coefficient of 1.03338. This implies that a unit change in residential mortgage mismatch risk will cause an increase of 1.03338 in market returns for public mortgage originators.

The findings further revealed a Z value of 6.47 with a p-significance value of .000 which is less than .05. This suggests that mismatch risk has a significant positive effect on the market returns of public mortgage originators. Thus, the null hypothesis ( $H_{02}$ ) residential mortgage mismatch risk has no significant effect on market returns of publicly listed mortgage originators in Kenya is rejected. The findings further revealed

that firm market risk has a moderating effect on the relationship between residential mortgage mismatch risk and market returns of public listed mortgage originators. The moderating effect of firm market risk resulted in a decrease of 2.79% (a decrease from 0.2579 to 0.2300) between residential mortgage mismatch risk and market return of public mortgage originating firms.

From empirical literature, Mukanzi, *et al.* (2016) carried out a study whose findings revealed a significant positive relationship liquidity risk and the stock returns. Similarly, Mwangi (2014) carried out a study whose findings revealed that mismatches between liabilities and assets significantly influence financial performance for deposit taking microfinance institutions. In contrast, Babi (2015) conducted a study whose findings revealed that liquidity risk had an insignificant effect on the relationship between earnings per share and stock return.

### **5.2.3 Effect of residential mortgage default risk on market return of public mortgage originators**

Default risk refers to the likelihood that a borrower will not be able to meet their payment obligations when they fall due (Apostolik & Donohue, 2015). Default risk is also referred to as credit risk. Mortgage originators whose borrowers default face the following risks: loss of the principal, interest, and higher collection costs.

The average residential mortgage default risk for mortgage loans for publicly listed mortgage originators stands at 7.96% with a standard deviation of 0.04219. This suggests that the variation of residential mortgage default risk among public mortgage originators is not overly dispersed. Thus, residential mortgage default risk is a major



concern to all publicly listed mortgage originators. The findings also revealed a coefficient of variation of 0.51048. In addition, a skewness of 0.507 with reference to residential mortgage interest rate frequency distribution was derived. This suggests that the residential mortgage interest rate frequency distribution does not significantly deviate away from a normal distribution.

The findings revealed a negative correlation coefficient of -0.734 between market return of public listed mortgage originators and residential mortgage default risk. From the data collected, an R square value of 0.3205 was revealed between residential mortgage default risk and market returns of publicly listed mortgage originators. This suggests that 32.05% of variation in market returns for publicly listed mortgage originators is explained by residential mortgage default risk. The findings further reveal a beta coefficient of -0.4138163. This suggests that a unit change in residential mortgage default risk will cause a decrease of 0.4138163 in market returns for public mortgage originators.

The findings also reveal a Z value of -7.80 with a p-significance value of .000 which is less than .05. This suggests that residential mortgage default risk has a significant effect on the market returns of public mortgage originators. Consequently, the null hypothesis ( $H_{03}$ ) residential mortgage default risk has no significant effect on market returns of public mortgage originators is rejected. The findings further revealed that firm market risk had a significant moderating effect on the relationship between residential mortgage default risk and market returns of public mortgage originators. In particular, firm market

risk resulted in a variation decrease of 16.69% for the relationship between residential mortgage default risk and the market returns of public mortgage originators.

Empirical literature reveals similar findings. Christoph and Ralf (2009) carried out a study for instance whose findings revealed that high default risk experience lower returns in both the US and Germany markets. Similarly, Khan *et al.* (2018) argues that credit risk has significant negative relationship on stock return. Mwaura, Muturi and Waititu (2017) carried out a study whose findings revealed a significant negative relationship between non-performing loans ratio and stock returns. On the contrary, Kithinji (2010) study findings revealed that there was no significant relationship between the level of non-performing loans and bank profitability.

#### **5.2.4 Effect of residential mortgage price risk on market return of public mortgage originators**

Price risk refers to the possibility of value decline of a portfolio or security (Cusatis & Thomas, 2005). With reference to the mortgage industry, price risk is the possibility of adverse effect in the value of the mortgage commitment as a consequence of changes in mortgage rates (Shiller, 2012). From the findings, the average interest rate for residential mortgage loans was 21.93% with a standard deviation of 0.11195. This suggests that there is high variation among public mortgage originators when it comes to the interest rates they charge on mortgage products. The findings further revealed a coefficient of variation of .51048. In addition, a skewness of 0.507 was established with reference to residential mortgage interest rate frequency distribution. This implies that

the residential mortgage interest rate frequency distribution does not significantly deviate away from a normal distribution.

The findings also revealed a negative correlation coefficient of -0.583 between residential mortgage interest rate and market returns for public listed mortgage originators. From data collection process of the study, the findings reveal an R square value of 0.4529 between residential mortgage price risk and market returns of publicly listed mortgage originators. This suggests that 45.29% of variations of market returns for publicly listed mortgage originators is influence by residential mortgage price risk. The findings further reveal a beta coefficient of -0.4539684 which implies that a unit change in residential mortgage price risk will cause a decrease of 0.4539684 in market returns for public mortgage originators.

The findings further presented revealed a Z value of -9.93 with a p-significance value of .000 which is less than .05. This suggests that residential mortgage price risk has a significant effect on the market returns of public mortgage originators. Thus, the null hypothesis ( $H_{04}$ ) residential mortgage price risk has no significant effect on the market returns of public mortgage originators is rejected. The findings further reveal that firm market risk has a significant moderating effect on the relationship between residential mortgage price risk and market returns of public mortgage originators. In particular, firm market risk results in a variation decrease of 0.97% between residential mortgage price risk and the market returns of publicly listed mortgage originators.

The findings of the study are similar to that of empirical literature Oyedele (2017) for instance conducted a study whose findings revealed that a rise in interest rates will

negatively affect stock market performance. Similarly, Amarasinghe (2015) conducted a study whose findings revealed that there is a negative significant relationship between interest rate and stock price. In the same light, Ndung'u (2012) also carried out a study whose findings revealed that fluctuations in interest rates can adversely affect the performance of the NSE market.

In contrast, Avallone (2017) notes that current world stock prices are rising despite global instability, stock market correction, and rising interest rates. In the same vein, Vaz *et al.* (2008) carried out a study whose findings revealed a positive significant relationship between interest rate fluctuations and bank stock returns. Similarly, Obegi and Oluoch (2019) argue that interest rates had a positive none significant effect on bank profitability. Another study revealing similar findings was that of Ayub and Masih (2013) who argues that there is no significant relationship between interest rates and Islamic bank stock prices.

#### **5.2.5 Effect of mortgage risk on market returns of public mortgage originators**

Mortgage risk is the likelihood or risk that a mortgage borrower will fails to meet their obligations – interest and principal – when they fall due (Barth, 2009). In addition, it encompasses the risk from the origination stage to the when the mortgage is fully settled by the mortgagor. Empirical literature is inconclusive on the influence of mortgage risk on market returns of public listed mortgage originators in Kenya. This study sought to fill this gap. The findings from the data collected reveal an R square value of 0.5570 between mortgage risk and market returns of publicly listed mortgage originators. This

suggests that 55.7% of variation in market returns for publicly listed mortgage originators is influenced by fallout risk, mismatch risk, default risk, and price risk.

The findings further reveal a beta coefficient of 0.0011241 between residential mortgage fallout risk and market returns of public mortgage originators. The findings further reveal a z value of 0.21 with a p-significance value of 0.054 for residential mortgage fallout risk. This suggests that residential mortgage fallout risk has a partial significant effect on the market returns of public mortgage originators. This finding is in line with the bivariate results between residential mortgage fallout risk and market returns.

Findings also reveal a beta coefficient of -0.0472512 between residential mortgage default risk and market returns of public mortgage originators. In addition, findings reveal a Z value of -2.10 with a p-significance value of 0.036 between residential mortgage default risk and market returns of public mortgage originators. This suggests that residential mortgage default risk has a significant negative effect on the market returns of public mortgage originators. This finding is in line with the bivariate results between residential mortgage default risk and the market returns of publicly listed mortgage originators.

The findings revealed a beta coefficient of 0.6445824 between residential mortgage mismatch risk and market returns of public mortgage originators. In addition, findings revealed a Z value of 4.83 with a p-significance value of 0.000 between residential mortgage mismatch risk and market returns of public mortgage originators. This suggests that residential mortgage default risk has a significant positive effect on the market returns of public mortgage originators. This finding is the same as bivariate

results between residential mortgage mismatch risk and market returns of public mortgage originators.

The findings further reveal a beta coefficient of -0.3666275 between residential mortgage price risk and the market returns of public mortgage originators. The findings further reveal a Z value of -8.16 with a p-significance value of .000 which is less than .05. This suggests that residential mortgage price risk has a significant negative effect on the market returns of public mortgage originators. This finding is in the same line as that suggested with the bivariate results between residential mortgage price risk and market returns for public mortgage originators in Kenya.

#### **5.2.6 Moderating effect of firm market risk on the effect of mortgage risk on market returns of public mortgage originators**

Market or systematic risk refers to risks which affect all institutions within an economy (Bierman & Smidt, 2003). Market risk cannot be diversified away due to the fact that it affects all firms in the economy (Akenga *et al.*, 2015). In this case, firm market risk was measured using firm market beta. From the findings, the mean and standard deviation for firm market risk was 1.0594 and 0.78315 respectively. According to Bierman and Smidt (2003), a stock that has a market beta of 1 is strongly correlated to the market. This suggests that public mortgage originating firms are more volatile than the market. In particular, 5.94% more volatile than the market. This can be further confirmed from the coefficient of variation of .73923 which is the second highest level of volatility for all the risk indicators. The findings further reveal a skewness value of 0.409 for firm market

risk. This suggests that data relating to firm market risk does not significantly deviate away from a normal distribution.

The findings also reveal a moderate low negative correlation coefficient of -0.358 between firm market risk and the market returns of public listed mortgage originators. In addition, an R square value of 0.4512 is revealed between mortgage risk and market returns of publicly listed mortgage originators with the moderator being firm market beta. This suggests that 45.12% of variations in market returns for publicly listed mortgage originators are influence by residential mortgage fallout risk, residential mortgage mismatch risk, residential mortgage default risk, and residential mortgage price risk with firm market risk being the moderator.

Consequently, firm market risk has a significant moderating effect on the relationship between mortgage risk and the market returns of public listed mortgage originators. This is attributed to the fact that the moderating effect of firm market risk results in a decrease variation of 10.58% between mortgage risk and the market returns of publicly listed mortgage originators. The findings further revealed a significance value of .000 which is less than .05. Consequently, the null hypothesis ( $H_{05}$ ) there is no significant moderating effect of market risk on the effect of mortgage risk on market returns of publicly listed mortgage originators in Kenya is rejected. Consequently, the alternative hypothesis is accepted.

### **5.3 Conclusion**

The mortgage sector plays a critical role to both social and economic development to both developed and developing countries. Kenya is therefore not an exception. The

mortgage sector in Kenya has grown considerably in terms of both the number of mortgage accounts and the number of firms offering mortgages. This can be attributed to a number of factors including the increased demand for housing within the Kenyan market. However, Kenya's mortgage industry is still underdeveloped when compared to other developing countries. Empirical and contextual literature further reveals fluctuations in the market returns of mortgage originating firms in Kenya. However, study findings are inconsistent and inconclusive with reference to how mortgage risks influence the market returns of mortgage originators in Kenya.

From theoretical literature, existing theories provide contradictory explanations as to how mortgage risk affects market returns of market originators. For instance, credit risk by mortgage originators can be significantly managed through the application of the title theory. However, mortgage originators default risk cannot be significantly reduced through the application of the lien theory. Similarly, through the application of the MPT theory; mortgage originators can mitigate mortgage risk factors and thereby improve on their financial performance and market returns.

The overall objective of the study was to determine the effect of mortgage risk on market returns of public mortgage originators in Kenya. The specific objectives of this study were: First, to determine the effect of residential mortgage fallout risk on market returns of publicly listed mortgage originators in Kenya. Secondly, to establish the effect of residential mortgage mismatch risk on market returns of publicly listed mortgage originators in Kenya. Thirdly, to find out the effect of residential mortgage default risk on market returns of publicly listed mortgage originators in Kenya. Fourthly, to ascertain



the effect of residential mortgage price risk on market returns of publicly listed mortgage originators in Kenya. Lastly, to find out the moderating effect of firm market risk on the effect of mortgage risk on market returns of public mortgage originators in Kenya.

In order to achieve this, the study adopted a positivism research philosophy. In addition, the study utilized a descriptive form of research design and a quantitative research approach. A census of all the 11 publicly listed mortgage originators was utilized. The study sourced its data from secondary sources: Central Bank of Kenya bank supervision reports, Nairobi Securities Exchange, Kenya National Bureau of Statistics (KNBS), and financial statements of the 11 publicly listed mortgage originators. Annual secondary data was sourced from the year 2009 to 2019, the study period. Data was analyzed through descriptive and inferential statistics. For descriptive statistics, mean, standard deviation, coefficient of variation, skewness, and kurtosis was utilized to summarize the data collected. For inferential statistics, a panel data regression model, correlation analysis, z-tests, and chi-square tests were utilized draw inference from the data collected. Diagnostic tests – Hausman test, normality test, multicollinearity test, autocorrelation test, heteroscedasticity tests, unit root test, and Granger causality test – were carried out to validate the data collected.

The findings collected revealed that residential mortgage fallout risk has a significant positive effect on the market returns of publicly listed mortgage originators. In addition, residential mortgage mismatch risk has a positive significant effect on the market return of publicly listed mortgage originators. Findings further revealed that residential mortgage default risk has a significant negative effect on the market returns of public

mortgage originators. In addition, residential mortgage price risk has a significant negative effect on the market returns of public mortgage originators. With regards to the overall objective of the study, the findings revealed that mortgage risk has a significant effect on the market returns of publicly listed mortgage originators. The findings further revealed that firm market risk has a significant moderating effect on the relationship between the mortgage risk and the market returns of public mortgage originators in Kenya.

#### **5.4 Recommendations of the Study**

##### **5.4.1 Residential mortgage fallout risk and market returns of mortgage originators**

From the findings, it was evident that residential mortgage fallout rate had a significant effect on market return of mortgage originators. Thus, it is necessary for mortgage originators to develop an effective system of managing the fallout rate. Use of derivative instruments to manage the residential mortgage fallout rate. In addition, mortgage originators can offer competitive mortgage rates in order to reduce the fallout rate. Mortgage originators can also offer financial differentiated products that will give them an edge in terms of pricing when compared with their competitors.

##### **5.4.2 Residential mortgage mismatch risk and market returns of mortgage originators**

The findings revealed that residential mortgage mismatch risk had a significant effect on the market return of mortgage originators. It is recommended that mortgage originators to source for cheaper sources of long-term capital funds in order to finance residential

mortgages products. This can be achieved from both domestic and international sources. In addition, mortgage originators can securitize their debtor's portfolio. By so doing, mortgage originators can increase their interest rate spread and thereby effectively manage mismatch risk.

#### **5.4.3 Residential mortgage default risk and market returns of mortgage originators**

The findings further revealed that residential mortgage default risk has a significant effect on the market returns for mortgage originators. For this reason, mortgage originators should develop strategies of reducing their non-performing loans. It is recommended that mortgage originators improve their credit rating system in order to only offer loans to clients with good credit ratings. In addition, mortgage originators can employ the title theory and minimize the losses that arise when clients default on their obligations.

#### **5.4.4 Residential mortgage price risk and market returns of mortgage originators**

From the findings, it was evident that residential mortgage price risk has a significant effect on the market returns of mortgage originators. It is suggested that mortgage originators to use derivative instruments and competitive residential mortgage interest rates in order to hedge against fluctuations in interest rates which effectively has an impact on their revenues and market returns.

#### **5.4.5 Moderating effect of firm market risk on the relationship between mortgage risk and market return of public mortgage originators**

From the findings, it was evident that firm market risk has a significant moderating effect on the relationship between mortgage risk and market returns of publicly listed mortgage originators listed at the NSE. It is suggested that mortgage originators apply modern portfolio theory in order to adequately manage idiosyncratic risk. By utilizing risk diversification strategies, mortgage originators can adequately minimize market risk which can in turn positively influence their market return.

#### **5.5 Recommendations for Further Studies**

There are a number of financial institutions excluding banks which are offering mortgage products. For instance, Savings and Credit Co-operatives (Saccos) are offering mortgage products for their clientele. It is therefore imperative to conduct an investigation which seeks to determine the extent to which mortgage risk influences their ROI.

With the creation of KMRC, capital with favorable interest rates will be readily available to mortgage firms. There will be need to investigate the extent to which KMRC has influenced mortgage risk and further investigate how it has influenced the financial performance and market returns for mortgage lenders in the country.

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## APPENDICES

### Appendix I: Data Collection Sheet

Year	AUC (No.)	TMACL (No.)	NPM (Ksh.)	TLM (Ksh.)	STD (Ksh.)	IR (Percentage)
2009						
2010						
2011						
2012						
2013						
2014						
2015						
2016						
2017						
2018						
2019						

AUC represents Total Number of Residential Mortgage Uptake by Customers, TMACL represents Total Number of Residential Mortgage Applicants with Commitment Letters, NPM represents Non-Performing Residential Mortgage Loans, TLM represents Total Residential Mortgage Loans and Advances, STD represents Short Term Deposits, and IR represents Residential Mortgage Interest Rates

## **Appendix II: Sampling Frame**

1. Barclays Bank Limited
2. The Co-operative Bank of Kenya Limited
3. Diamond Trust Bank Kenya Limited
4. Equity Group Holdings
5. I & M Holdings Limited
6. KCB Group Limited
7. National Bank of Kenya Limited
8. NIC Bank Limited
9. CFC Stanbic Holdings Limited
10. Standard Chartered Bank Kenya Limited
11. HF Group Limited

**Source: Nairobi Securities Exchange (2017)**