RESIDENTIAL MORTGAGE MISMATCH RISK AND MARKET RETURNS OF PUBLIC MORTGAGE ORIGINATOR FIRMS IN KENYA

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Abstract

Despite the rapid growth of Kenya's real estate sector; Kenya's mortgage industry is characterized as underdeveloped. Institutional factors attribute this to various factors including: high nonperformance loans, interest rate volatility, and liquidity risk. However, literature is inconclusive with regards to the relationship between mismatch risk and market returns of mortgage firms. In addition, market return for mortgage originating firms in Kenya has been uncertain. Consequently, this study sought to establish the relationship between residential mortgage mismatch risk and market returns of public mortgage firms in Kenya. 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. The study adopted quantitative research approach and descriptive research design. Secondary data for the period 2007 to

2017 was sourced from 11 public mortgage originating firms in Kenya. A panel data regression model was used for analysis. Findings reveal that residential mortgage mismatch risk had an average of 0.1194 with a standard deviation of 0.08349. In addition, there was a significant R square value of 0.2789 between residential mortgage mismatch risk and market returns of publicly listed mortgage originators. The study recommends that mortgage firms should source for cheaper sources of long-term capital funds and securitize their debtor's portfolio.
Keywords: Mortgage Financing, Market Returns, Mismatch Risk, Mortgage, Real Estate

INTRODUCTION

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. For instance, 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). 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. Examples of 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). 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 sell to borrowers in their portfolio (Mwaniki, 2017).

Consequently, Kenyan mortgage firms face more risks as compared to mortgage originators who securitize and sell the mortgages they originate. According to Mwaniki (2017),

additional risks to 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). Mortgage firms in Kenya fund their business assets with deposits which can be called at any time (Ngugi, 2017). Consequently, mismatch risk arises.

Ngugi (2017) argues that mortgage firms in Kenya have for a long period experienced a mismatch between their assets and liabilities. Empirical literature has explored the significance of asset-liability management within financial institutions. For instance, Anjichi (2014) argues that asset-liability mismatch has a significant effect on the financial performance of a financial institution. Similarly, Tektas, Gunay and Gunay (2005) assert that asset-liability management can be utilized as a strategy by financial institutions to maximize their profitability and further manage financial distress. However, empirical literature is inconclusive with respect to the effect of mismatch risk on the market returns of financial institutions.

Since 2010, the market return for commercial banks (mortgage originating firms) in Kenya has been uncertain. For instance, in 2015 six of the eleven listed mortgage originating firms at the NSE experienced a decline in their earnings per share (EPS). This has be credited to a number of factors one being mismatch risk. In light of this, the study sought to establish the effect of residential mortgage mismatch risk on market returns of publicly listed mortgage originating firms in Kenya.

LITERATURE REVIEW AND HYPOTHESIS

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).

Arif and Anees (2012) carried out a study which sought to determine the influence of liquidity risk on bank performance. The study was secondary-based and data was collected from 22 Pakistan commercial 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.

Similarly, 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. Findings revealed that 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.

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, Taml Nadu Mercantile Bank, Karur Vysya Bank, and Lakshmi Vilas Bank. Study findings 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.

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: price volatility and capital inflows. The revealed findings further 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 crises than financial institutions which have high maturity 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 the following as some of the factors which significantly impact on bank profitability: 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 profitability.

In Kenya, 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. Similarly, 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 cash flows from the borrowers.

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 influence financial performance for deposit taking microfinance institutions.

Literature is inconclusive with respect to the relationship between maturity mismatch risk and market return. Instead, literature focuses on relationship between maturity mismatch risk and institutional financial performance. In addition, it focusses on all financial institutions with the exception of mortgage originating firms. Consequently, the H01 for the study was: Residential mortgage mismatch risk has no significant effect on market returns of publicly listed mortgage originators in Kenya.

METHODOLOGY

The researcher adopted both quantitative and descriptive research designs. Quantitative research design is used to develop mathematical models which are used to test the study's hypothesis (Leavy, 2017). Similarly, descriptive research design is utilized to determine the characteristics of a particular element. Both research designs were utilized to validate the study's hypotheses. A census of the eleven publicly listed mortgage firms was selected as the study's population. The study sourced its data from secondary sources. The researcher sourced data from: Central Bank of Kenya (CBK) bank supervision reports, and the Nairobi Securities Exchange (NSE). Data was further sourced from financial statements released by the 11 listed public mortgage originators in Kenya. Secondary data was sourced from the year 2007 to 2017. Data for the period between the year 2007 and 2017 was complete and adequate to derive trends and variations. A panel data regression model was used to draw inference from the secondary data collected. In addition, descriptive statistics was utilized to summarize the quantitative data collected. The Statistical Package for Social Science (SPSS) was utilized for descriptive analysis. The statistical software STATA was utilized for conducting inferential statistics. Diagnostic tests were further conducted on the data collected.

According to Li and Zhang (2017), mismatch risk describes mismatches 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.

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

Below is the representation of the model for the study:

$Y_i = \beta_0 + \beta_1 X_{1,t} + \varepsilon_i$

β_1, represent the specific beta coefficient. X_1 represents mismatch risk. ε_i represents the error term in the model. β_0 represents the constant while Y_i represents market returns. 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 measured from stock market prices. Market return was measured using the ratio displayed below.

$$Market\ Return = \frac{Ending\ Price - Starting\ Price}{Starting\ Price}$$

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.

Normality tests were also conducted to determine whether study variables had a normal distribution. The test for normality in this case was measured using Kolmogov-Smirnov statistic. Autocorrelation tests were further performed using the Durbin Watson Test (D) to determine data challenges that may arise from using time series data. The Durbin Watson Test was utilized to test the relationship between variables separate from each other by a given time lag.

FINDINGS AND DISCUSSION

Table 1: Descriptive Statistics

	N	Mean	Std. Deviation	Coefficient of Variation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Mismatch Ratio	121	.1194	.08349	69.92462	.348	.220
Expected Market Return	121	.0905	.04198	46.38674	.484	.220

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 at the end of every year. According to the findings presented in Table 1, residential mortgage mismatch risk had an average of 0.1194. This suggests that the average residential mortgage mismatch risk for the eleven publicly listed 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 publicly listed mortgage originators is not overly dispersed. The findings further revealed that the skewness for residential mortgage market risk was 0.348. 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. In addition, a normal distribution curve has a skewness of zero. Consequently, the frequency distribution for mismatch risk does not significant deviate away from a normal distribution. Findings further revealed a coefficient of variation of 69.92462.

The findings further presented in Table 1 reveal a mean for market return 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. The

findings further reveal a skewness of 0.484 for the market return frequency distribution. Consequently, the distribution does not significantly deviate away from a normal distribution. Findings further revealed a coefficient of variation of 46.38674 for the market returns of public listed mortgage originators in Kenya.

Table 2: Test of Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Mismatch Risk	.285	121	.707	.580	121	.097
Market Return	.227	121	.067	.884	121	.064

The test for normality in this case was measured using Kolmogov-Smirnov statistic. The Table 2 above presents the results for the test for normality. According to Gray (2016), a sig. value of more than 0.05 for the Kolmogorov-Smirnov test signifies normality in a distribution. From the results presented in Table 2 above, all the variables – mismatch risk and market return – had a sig value of more than .05. This suggests that the study variables were normally distributed. For this reason, the study could utilize a regression model for statistical inference.

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 3 presents the Durbin-Watson test results for the autocorrelation test.

Table 3: Test for Autocorrelation

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

According to the findings presented in Table 3, the Durbin-Waston 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. Consequently, a regression model was utilized for statistical inference.

A Hausman Specification was carried out to test the presence of predictor variable in study's regression equation. Presence of endogenous regressors would violate one of the assumptions of ordinary least squares. In addition, the Hausman Speciation test enabled the

study to identify the panel model – fixed or random effects model – to utilize in the analysis process. Based on the results of the Hausman Specification Test, the study adopted the Random Effect Panel Model (REM).

Table 4 presents the panel regression results between residential mortgage mismatch risk and the market returns of publicly listed mortgage originators.

Table 4: Panel Modelling for the relationship between mismatch ratio and market return

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

R-sq: within = 0.2416	Obs per group:	min =	11
	`	avg =	11.0
overall = 0.2789		max =	11

	Wald chi2(1)	=	38.68
corr(u_i, X) = 0 (assumed)	Prob > chi2	=	0.0071

MarketReturn	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
MismatchRatio	.4835097	.077742	6.22	0.000	.3311382 .6358812
_cons	.4813034	.1010191	4.76	0.000	.2833096 .6792973

sigma_u	.3134021
sigma_e	.19063432
rho	.72992853 (fraction of variance due to u_i)

The findings reveal an R square value of 0.2789 between residential mortgage mismatch risk and market returns of publicly listed mortgage originators. This suggests that 27.89% of variation in market returns for listed mortgage originators is explained by mismatch risk. Table 4 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 0.4835097. This implies that a unit change in residential mortgage mismatch risk will cause an increase of 0.4835097 in market returns for public mortgage originators. In addition, Table 4 reveals a significance value of .000 which is less than .05. This suggests that mismatch risk has a significant effect on the market returns of public mortgage originators. Thus, we reject the null hypothesis (H_{01}) – residential mortgage mismatch risk has no significant effect on market

returns of publicly listed mortgage originators in Kenya. Consequently, we accept the alternative hypothesis which states that residential mortgage mismatch risk has a significant effect on the market returns of public mortgage originators.

Similarly, 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 crises 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. 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.

CONCLUSION

The findings revealed that mismatch risk has a significant effect on the market return of mortgage originators. It is therefore 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.

The findings of this study could be limiting through two ways. First, new developments within Kenya's financial market are likely to significantly influence the level of mismatch risk experienced by mortgage players in Kenya. Secondly, 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.

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