INTEREST RATE RISK AND VALUE OF THE FIRM AMONG PRIVATE EQUITY FIRMS IN FRONTIER MARKETS: INSIGHTS FROM DEPOSIT TAKING SAVINGS AND CREDIT COOPERATIVES IN KENYA

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Full Length Research

Citation: Waitherero, K. F (2021). Interest rate risk and value of the firm among private equity firms in frontier markets: Insights from deposit taking savings and credit cooperatives in Kenya. *International Academic Journal of Economics and Finance, 3(6), 388-404.*

ABSTRACT

Savings and credit cooperatives (SACCOs) form an integral part of the financial sector across the globe. However, in pursuit of their wealth creation goals, these cooperatives are exposed to numerous risks that threaten their performance and survival. One such risk is interest rate risk arising from variations in interest rates as a result of unpredictable movements in interest rates. This variation in interest rates may adversely affect the value of such institutions. In spite of the critical role played by deposit taking SACCOs and the relevance of interest rate risks management on their value, the relationship existing between the variables has not been given due attention by previous scholarship. Majority of scholars focus on commercial banks and others concentrating on other elements of financial risk such as credit risk, default risk, and exchange risk. The study therefore sought to establish the effect of interest rate risk on the value of the firm among deposit taking SACCOs in Kenya. The study was anchored on the Trade-off theory which opines that firm management must trade-off between the risk of bankruptcy and agency cost and the interest tax shield benefits associated with utilisation of debt in the capital structure. Positivism research philosophy was deployed with descriptive research design and causal research design being adopted. The target population for this study consisted of all the 164 deposit taking SACCOs licensed by Sacco Societies Regulatory Authority (SASRA) from which a sample size of 115 deposit taking SACCOs were selected using stratified sampling technique. The study exclusively utilized secondary data obtained from audited financial statements and Sacco offices using a data collection sheet. Descriptive statistics such as means, standard deviation, skewness and kurtosis were used. Inferential data analysis was conducted using Pearson correlation coefficient and panel regression model involving cross-sectional data. In testing the fitness of the model, the coefficient of determination R2 was used. F-statistic was also computed at 5% significance level to test whether there is any significant relationship between interest rate risk and SACCO value. The study concluded that interest rate risk has a significant effect on the value of the firm among deposit taking SACCOs in Kenya. The study therefore recommends that the management should seek to increase fixed rate assets so as to reduce fixed interest rate gap as well as variable rate assets to increase variable rate gap. This study was based on deposit taking SACCOs and therefore the findings may not be applicable in other forms of organisation such as among non-deposit taking SACCOs, commercial banks, and Microfinance institutions. The study thus suggests that other studies be conducted among non-deposit taking SACCOs, commercial banks, and Microfinance institutions to establish if the findings in this study would concur.

Key Terms: Co-operatives, Firm value, Interest rate risk, Savings and Credit Cooperative (SACCO).

INTRODUCTION

The emergence of financial institutions in the financial markets has provided savers and investors alike with an avenue to invest their resources and source of finance for investment respectively (Chan & Wong, 2015). Savings and Credit Cooperatives (SACCOs) form an integral part of the financial sector in all parts of the world. They offer intermediation services by providing a platform where individuals and institutions can save their money and investors access capital. However, in pursuit of their objectives, these SACCOs are exposed to numerous risks that threaten their performance and survival. One such risk is interest rate risk. In view of Christoffersen (2012), risk is the possible occurrence of unexpected unfavourable events in future. Deposit Taking SACCOs (DTS) by default face this risk since they operate in a very volatile environment where interest rates fluctuate in line with market forces of demand and supply. On the other hand, Deposit Taking SACCOs only lend to their customers without accepting deposits from them and therefore, their predominant risk is default risk. This study gives special attention to Deposit Taking SACCOs.

Notably, Askari, Iqbal and Mirakhor (2011) explained that a risk management strategy improves the financial performance of an organisation by minimizing their exposure to market uncertainties. In agreement with this, McNeil, Frey and Embrechts (2015) notes that the management of risks result to reduced expenditure, more revenue, increased customers, and production of maximum profitability for an organisation. As a result, risk management is an integral part of the business activities for DTS (Githiomi & Maina, 2016). Therefore, SACCOs must strike an optimum balance between risk and return while at the same time minimizing the possibility of unacceptable outcomes on their performance. Arising from the foregoing, the existence of DTS is based on how well they manage the financial risks they face (Chan & Wong, 2015).

Interest rate risk is defined by Landier, Sraer and Thesmar (2013) as the uncertainty on interest rates as a result of unpredictable movements in interest rates. This variation in interest rates may adversely affect performance of financial institutions such as banks, microfinance institutions, and SACCOs. Movements in interest rates influence financial performance of commercial banks by changing the expected net interest income and expenses. It follows therefore profitability increases as interest rates rise due to the interest rate spread (Dell'Ariccia, Laeven & Marquez, 2014). This is because performance of DTS is directly related to interest rates holding all other factors constant. For this reason, changes in interest rates expose financial institutions to interest rates risk.

When interest rates change, the current value and timing of expected cash flows also change (Basel Committee, 2015). An organization with more corporate debt is therefore highly exposed to changes in interest rates thus lowering its value as a result of increased financial risk (Fitzpatrick, 2004). This informed by the fact that interest rate risk influences financial risk. This emanates from the uncertain and volatile nature of interest rates within the economy. In a free economy, interest rates are subject to unpredictable economic conditions,

which adversely influence interest rates. Lenders such as DTS are therefore affected from two fronts; as finance providers and finance beneficiaries.

Savings and credit cooperatives are by their nature vulnerable to interest rate risks arising from their weak organisational structures, weak regulatory environment and limited access to resources as they rely on member contribution for their capital (Sadgrove, 2016). Moreover, there is little control and monitoring of risks among DTS, which results to increased default among creditors. Additionally, many DTS lack governance policies and strategies to ensure that credit risk processes provided are followed. Further, in the international arena, financial risk is accompanied by cultural, legal, and political risks, which exposes these businesses to more risks in their operations and business transactions (Minnis, 2011).

The existence of SACCOs can be traced back in England in the 18th century where they were established as socioeconomic movements aimed at improving the living standards of the members (World Council of Credit Unions (WOCCU), 2015). Formal SACCOs were however first established in Germany to provide unique financial services to rural low-income earners who have low incomes that is volatile and were considered unbankable. Henceforth, the SACCOs movement has grown tremendously. The WOCCU (2015) statistical report indicated that there are 57,000 SACCOs in the world distributed across the 6 continents, 105 countries with over 1.5 trillion US dollars savings and an asset base of 1.8 trillion US dollars. Worldwide the SACCOs movement has a penetration rate 8.2 percent. In US SACCOs have over 100 million customers and an asset base of $1 trillion. In Europe, SACCOs serve 81 million customers and an average market share of approximately 20% while Asia serve 45.3 customers according to Association of Asian Confederation of Credit Unions Annual Report (2014).

Turnover for the 300 largest SACCOs in the world grew by 11.6% in 2018 to reach 2.2 trillion US Dollars According to ICA (2016). The overall turnover of nearly 2,000 cooperatives in the 65 countries surveyed by the Monitor totals $2.6 billion. Data for collected from 2,575 entities indicated that 1,157 of them had a turnover of more than 100m US Dollars. The top 300 cooperatives comprise of Saccos in insurance sector (32%), agriculture (35%), wholesale and retail trade (19%), banking and financial services (8%), industry and utilities (2%), health, education and social care (2%) and other services (2%).
In Africa, some 39,447 SACCOs serving 35,783,426 members in the region which, the well-established ones are situated in 28 countries (WOCCU, 2018). The membership of SACCOs in these countries is estimated at 8% of the world membership. With savings of 62% of total savings and loans portfolio of 65% of total loans in the continent, the Sacco movement in Africa becomes the 3rd largest in the world after Asia and North America with approximately 36 million and 102 million respectively. Africa mobilizes savings and shares amounted to 9,595,813,824 US Dollars in 2018, loans stood at 8,132,652,469 US Dollars, reserves amounted to 1,059,830,173 US Dollars with assets 10,779,858,693 US Dollars with a penetration rate of 13.80%. The region's savings level and loans represent 0.4% of the worldwide savings and loans respectively (WOCCU, 2018).

The establishment of the Lumbwa Cooperative Society by European colonists in 1908 was the onset of the developments of Saccos in Kenya (Njenga & Jagongo, 2019). SACCOs have gradually responded to the dynamic and competitive economic setting. In Kenya, SACCOs controls approximately Ksh 490 billion in the form of assets and savings, equivalent to 55% of the domestic budget (SASRA 2019). The World Council of Credit Unions identified Kenya's SACCO sub sector as one of the fastest growing sectors in the world. In its 2015's report, WOCCU (2015) identified the sectors growth as top in Africa and at 7th Position in the World. In 2014, Kenya was admitted to the top 10 group of most developed Sacco Movement globally to join Ireland, United States of American, Brazil, Mexico, Poland, Australia, Caribbean, Canada and Costa Rica. Among the loans and savings mobilised by African based SACCOs, the Kenyan sector contributes 65% of these credit and 62% of the savings, which makes it the most influential SACCO in the African context (World Bank, 2016).

Unlike in other jurisdictions, SACCOs in Kenya are categorized into two primary classifications; Deposit taking SACCOs (DT-SACCOs) and Non-Deposit taking SACCOs (Non-DT-SACCOs) (Anania, Gikuri & Hall, 2015). DT-SACCOs are constitutionally allowed to carry out demand deposits and thus provide services similar to those offered by banks. This is confirmed by the membership of the SACCOs, which stood at 3.6 Million persons registered as using the financial services of DT-SACCOs in 2016. These members are distributed in various proportions and they form a total of 164 DT-SACCOs, which are licensed and operational in the country (SASRA, 2019).

Despite, the potential displayed by DTS, it is worth noting that most DTS in Kenya face huge loan backlogs which may lead to default. This default may lead to Sacco members losing their capital. Similarly, when loans remain outstanding for long, DTS stand to lose due to fluctuation in interest rates exposing them to interest rate risk. Since DTS also borrow money to advance loans to their customers they are inherently faced with the risk of changing interest rates which may adversely affect their value (SASRA, 2019). As a result, most DTS result to less risky short term lending which is less profitable as opposed to long term lending (World Bank, 2016). However, the effect of interest rate risk on performance in DTS has not been given prominent attention by previous scholarship with many focussing on commercial banks and others concentrating on other elements of financial risk such as credit risk, default risk and exchange risk. The study therefore sought to establish the effect of interest rate risk on the value of the firm among DTS in Kenya.

LITERATURE REVIEW

The study was anchored on the Trade-off theory developed by Kraus and Litzenberger (1973) which focuses on balancing the agency and bankruptcy costs and the tax benefits that come with debt financing. The theory explains that management of an organisation makes the decision to use an appropriate level of debt financing that can bring the most tax benefits and the least agency and bankruptcy costs (Harris, 2015). According to the theory a rise in the debt–equity ratio provides a higher trade off in the bankruptcy costs and the tax shield

benefits which improves the value of the firm. Hackbarth, Hennessy and Leland (2007) argued that debt capital offers a higher trade-off between tax shelters and bankruptcy expenses, suggesting that debt increases, the value of the firm increases due to the interest tax shield. However, the firm becomes more exposed to bankruptcy, which motivates shareholders to invest in agency costs to avert any occurrence of such events.

Further, the ability to re-negotiate the loans interest rate increases the firm's ability to obtain debt capital (Eckbo & Kisser, 2015). Therefore, only the firm with the highest bargaining ability is able to get the biggest debt structure. Bigger and stronger organisations use both debt and equity capital due to their ability to raise equity capital. As a consequence, if a firm uses debt its value is influenced by debt, equity, tax shield benefits, agency and bankruptcy costs (Frank & Goyal, 2009). In this case, SACCOs that are not able to raise adequate equity to meet their daily cash needs and demand for cash in form of borrowings from their members, find themselves borrowing from other financial institutions such as commercial banks. Excessive reliance on this source of capital may therefore expose SACCOs to bankruptcy and agency costs. Since these costs have been found to have adverse effects on the value of the firm, these DTS are forced to strike a balance between the value of the firm and bankruptcy costs, agency costs as well as interest tax shield benefit.

The study found the theory relevant in explaining the effect of interest rate risk on the value of the firm. Precisely, the theory acts as a support to the interest rate risk variable since an increase in debt leads to a rise in the interest rate. In cases where the debt is subject to a changing interest rate, the interest rate risk increases since this interest rate is not easy to predict. When SACCOs lend money to their members, there is usually mutual agreement on the amount of interest rates to be charged. However, in some instances the interest rates on borrowed money may vary due to various factors (Sadgrove, 2016).

Researchers in the recent past have dwelt on the relationship between interest rate risk and other variables in the firm. However, majority of the studies have concentrated on performance of commercial banks. For instance, Carneiro and Sherris (2008) looked at the management of interest rate risk and its derivatives in Australia. The study looked into the demand of interest-rate-risk hedge by Australian firms that was quantified using the ratio of principal notional amount of interest rate derivatives to interest-rate-risk bearing liabilities. The data analysed was from two panel data collected from 1998 to 2003. Further, the information on the exposure to interest rate risks was obtained from raw data collection, which was obtained from the firm's financial records based on the Australian reporting standards. The study found significant relationship between interest-rate-risk hedge and company size, floating-interest-rate, debt ratio, annual returns, and company industry type.

In a study to evaluate the link between financial intermediation and interest rate risk in the G-10 countries, Zagonov (2011) adopted an econometric methodology and empirically investigated the interest rate risk exposure of financial intermediaries across a large international data sample over the 1997 to 2009 period. The results showed that interest rate exposure has significant weighting on the value of the firm for the majority of analysed firms. The results of this study were relevant to interest rate variable, however the study was

conducted among G-10 countries which are much more developed than developing countries, where, Kenya is ranked.

Studying management of interest rate risk in a commercial bank located in Vietnamese, Cao (2013) used both qualitative and quantitative methods of research. The research used the interview method to collect data. Additionally, a questionnaire was used on five members of staff. Additionally, secondary data was obtained from the banks reports and statements. According to the findings, the management of the interest rate risk for the bank was at an average level and there were few methods of quantifying its management. This led to the use of technology and hedging of the risk as a way to evaluate the risk. This conversely affected the value of the bank. The focus of this study was on interest rate risk management practices among commercial banks in Vietnam. The current study focused on interest rate risk and its effect on value of DTS in Kenya.

Employing a utility function and data for period of ten years from 2005–2014, Memmel, Seymen and Teichert (2017) investigated exposure to interest rate risk among German banks and found that the relationship between interest rate risk and interest yield is not as strong and its positive sign changes as the profits lower. The study also found a positive relationship between higher expected returns and interest rate exposure. However, the study focused in interest rate risk only and ignored other components of financial risk such as credit, capital and liquidity risk. Further, the study did not show the relationship between interest rate exposure and firm value as it the case in the current study. Additionally, this study was conducted in German banking industry, which is a developed economy, and therefore its findings may not be inferred on DTS in the Kenya.

In Kenya, Mbai (2006) studied the relationship between interest rate risk and net interest income of commercial banks quoted at the Nairobi Stock Exchange. Net interest income observed for 5-year period was regressed against interest rate risk in each year. Interest rate risk was measured as the interest rate sensitivity gap between assets and liabilities maturing in time bands of less than three months, between three and twelve months and maturities in periods above one year. The results showed that there is a strong direct relationship between interest rate risk and net interest income of commercial banks. Specifically, interest rate sensitivity gap movements account for 58.0% of variations in net interest income. Each of the three categories of interest rate sensitivity gap was found to positively contribute to net interest income. This study only concentrated on the relationship between interest rate risk and net interest income among commercial banks and not the value of the firm as envisaged in this study.

Evaluating the impact of derivative activities on interest rate risk exposure on commercial banks that were part of the Nairobi Stock Exchange Mwanza (2007) used data related to stock return, market index return, long term and short-term interest rates and other financial data extracted from the financial reports from 2001 to 2006. The study data was co11ected from the Nairobi stock exchange, Central bank of Kenya and the Capital markets authority. Using the augmented market model, the study found a positive relationship between the level

of derivative activities (TDER) and long-term interest rate exposures but unfavourable relationship with short-term interest rate and exchange rate exposure. In this study, interest rate risk was considered as a dependent variable while in this study it is treated as an independent variable.

There exists a significant relationship between financial performance (profitability) and risk management indicated by capital adequacy and debt management. The results were based on multiple regression analysis of secondary data obtained from commercial banks' yearly reports for the period 2007-2011 (Mwangi, 2012). However, this study only considered capital management risk. This study considered interest rate risk.

In a study to evaluate the effect of risk management on financial performance of insurance companies in Kenya, Omasete (2014) relied on explanatory study design with a population of 49 Kenyan insurance firms. Both primary and secondary data helped to get the information needed for the study. A questionnaire was used for collection of raw data while published reports and financial statements from IRA helped in the secondary data research. In this study, quantitative data was analysed using regression analysis. The most influential factor when it can to the financial performance of the firms was the identification of risks. Mitigation of risk, implementation of a risk management program, assessment of risk and the measurement of risk are the factors that followed. The conclusion made was that a favourable association exists between the study variables. This study was conducted in the insurance industry concentrating on risk management process and financial performance. This study evaluated the effect of interest rate risk on the value of the DTS in Kenya.

Based on the reviewed literature on interest rate risk, the study established that although there exist numerous studies on interest rate risk, most of these studies focussed on only one aspect of financial risk (Mbai, 2006; Mwangi, 2012; Cao, 2013). The study also noted that most of the existing literature relates to commercial banks and may not be inferred on DTS. Additionally, the study established that the bulk of empirical studies linking interest rate risk and value of the firm were conducted in other countries such as Vietnam (Cao, 2013) which is in Asia and German (Memmel, Seymen & Teichert, 2017), a developed country in Europe. The findings in these studies therefore may not be generalised on the current context. In other studies, interest rate was treated as a dependent variable (Mwanza, 2007) while in the current study it was evaluated as an independent variable.

RESEARCH METHODOLOGY

This study adopted the positivism research philosophy because it is based on real facts, objectivity, neutrality, measurement and validity of results (Saunders, 2011). Positivism maintains that knowledge should be based on facts and no abstractions, thus knowledge is predicated on observations and experiments in contrast to the phenomenological paradigm of searching for inner meaning or the essence of things (Neuman & Robson, 2014).

Both descriptive research design and causal research design were adopted in this study. Descriptive research design was used because the study sought to describe characteristics of the DTS and the variables being studied and describe, "What exists" with respect to variables and conditions in a situation as recommended by Ojukwu (2013). Further, the design was chosen because the study sought to determine the existence of certain relationships among the variables (Sekaran & Bougie, 2016). Explanatory research design was used to assess effect of specific changes on existing norms or processes and focus on analysing a situation or a specific problem to explain the patterns of relationships between variables. The causal design was also employed to determine the cause and effect relationship existing between the study variables by scrutinizing existing occurrence and then searching back through available data to try to identify reasonable contributory relationships.

The target population for this study consisted of all the 164 deposit taking SACCOs licensed by Sacco Societies Regulatory Authority (SASRA) in Kenya as at 27th January 2017. DTS were selected because they operate in the financial sector that is potentially exposed to financial risks and have been given a blind eye by scholars due do complexity of measuring their value mainly because they are private equity. DT-SACCOs were classified into five clusters based on the original bond and criteria for membership at incorporation as shown in table 1.

Table 1: Target Population Matrix

Cluster	Number of DT-SACCOs in the Cluster	Percentage
Government-Based	35	21.34
Teachers –Based	42	25.61
Farmers Based	46	28.05
Private Sector-Based	22	13.41
Community-Based	19	11.59
Total	**164**	**100.00**

Source: SASRA (2019)

From this population, a sample size of 115 DT-SACCOs was selected using stratified sampling technique. The sample size was calculated using the Cochran (1977) formula with a 95% confidence level and an error of 0.05. Since the population was stratified, a proportionate sample size representing 70% of SACCOs in each stratum was selected. The sample size was summarised as shown in table 2.

Table 2: The Sampling Matrix

Cluster	Number of DT-SACCOs in the Cluster	Ratio	Sample Size
Government-Based	35	0.70	25
Teachers-Based	42	0.70	29
Farmers Based	46	0.70	32

Private Sector-Based	22	0.70	15
Community-Based	19	0.70	13
Total	**164**		**115**

Source: Author (2019)

This study exclusively utilized secondary data obtained from audited financial statements and Sacco offices using a data collection sheet. Both descriptive statistics and inferential analysis were employed in data analysis. Descriptive statistics such as means and standard deviation skewness and kurtosis of the variables were used to show the characteristics of the data in terms of central tendency and the extent of dispersion from central tendency (Taylor, Bogdan & DeVault, 2015). Inferential data analysis was conducted using Pearson correlation coefficient and panel regression model involving cross-sectional data from DT-SACCOs registered by SASRA for a period of eight years. This model aimed to capture the interaction of interest rate risk and value of the DT-SACCOs. Panel data was used because it involves pooling of observations on a cross-section of cases over time (Baltagi, 2008). The model tested was summarised as shown in equation 1.

$Fv_{it} = \beta_0 + \beta_1 IRaRi_{it} + \varepsilon_{it}$ .... Equation 1
Where: -
Fv = Firm Value at time t
β_0, = Constants
IRaRi = Interest Rate Risk at time t
ε= Error Term at time t

In testing the fitness of the model, the coefficient of determination R^2, which is the ratio of the explained variance to the total variance of the dependent variable, was used. R^2 was used to measure the extent to which the variation in firm value is explained by the variations in interest rate risk management. F-statistic was also computed at 5% significance level to test whether there is any significant relationship between interest rate risk and the firm value of DT-SACCOs in Kenya. This analysis was done using Stata software and the findings presented in form of a research report.

RESULTS AND DISCUSSIONS

The study sought to establish the general description of the study variables. The results of descriptive analysis were as shown in Table 3.

Table 3: Interest Rate Risk Profile of SACCOs in Kenya

Variable	Obs	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
Interest Rate Risk	410	2.484678	4.85859	-10.8389	37.40925	0.327	3.447
Value of the Firm	410	1.517546	3.517641	-11.6478	33.85699	0.768	3.1059

Source; Research data (2019)

The descriptive results in Table 3 revealed that interest rate risk as measured by the difference between fixed rate assets and fixed rate liabilities was high with a mean score of 2.484678 billion shillings and a standard deviation of 4.85859 billion shillings. These results showed that there was high variation of fixed rate assets and fixed rate liabilities among DTS in Kenya. The range of interest rate risk with a minimum of -10.83888 billion shillings and a maximum of 37.40925 billion shillings supports these results. The negative results showed in the minimum values of fixed interest rate gap imply that most of the DTS had more fixed rate liabilities than fixed rate assets meaning that most of them had high volumes of debt compared to their asset base.

On the other hand the results are explained by the fact that some DTS such as those in the transport sector own few fixed assets (land and buildings, furniture, office equipment, and motor vehicles) while the bulk of fixed assets (motor vehicles) are owned by the members through the SACCO. Other DTS were also found to have few fixed assets of low value, which included office furniture and fittings, and motor vehicles, which were outweighed by their liabilities. It is thus observed that while some DTS were secured and insulated against interest rate risk some were adversely exposed to the risk.

These results concurred with the conclusions of Dell'Ariccia, Laeven and Marquez (2014), who noted that changes in interest rates expose financial institutions to interest rates risk and therefore concluded that firm value is directly related to interest rates holding all other factors constant. The findings were also consistent with the findings of Fitzpatrick (2004) who observed that companies with more corporate debt are highly exposed to changes in interest rates, which lower their value as a result of increased financial risk. At the same time, Zagonov (2011) evaluating the link between financial intermediation and interest rate risk showed that interest rate exposure has significant weighting on the value of the firm. Similarly, Krause and Tse (2016) supported that risk management increases firm value and returns.

Test for fixed effect

The results of the study were based on a fixed effect model. In order to establish whether fixed effects model was the most appropriate for the study, the F test for fixed effects was conducted. The results were as presented in table 4.

Table 4: F test Results

Fixed-effects (within) Regression		Number of obs =	410
Group variable: year		Number of groups =	1
R-sq:		Obs per group:	
	within = 0.0706	min= 82	
	between = 0.4231	avg = 82.0	
	overall = 0.0722	max= 82	
F (1,408) = 3.86			
.corr(u_i, Xb) = 0.0404		Prob > F = 0.0000	

Value of the firm	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
Interest rate risk	.1007443	.0369272	2.73	0.122	.0281487	.1733399
Id	-.0014755	.0071869	-0.21	0.047	-.0156043	.0126533
_cons	1.065669	.3732846	2.85	0.058	.3318245	1.799514
sigma_u	.30563054					
sigma_e	3.4147686					
Rho	.00794705 (fraction of variance due to u_i)					
F test that all u_i=0: F (4, 400) = 0.64				Prob > F = 0.6316		

Source; Research data (2019)

The - test results showed that the results show that Prob > F = 0.000 which was found to be less than the significance level at 0.05 and the study therefore concluded that fixed effect model was appropriate for this study.

Hausman Test was also conducted to confirm if random effects were appropriate for the study. The results were as shown in table 5.

Table 1: Hausman Test Results

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        ---- Coefficients ----
                |   (b)       (B)            (b-B)      sqrt(diag(V_b-V_B))
                |   fe        re            Difference     S.E.
-------------+----------------------------------------------------------------
Interest rate risk |  .4102286   .1709987    .2392299    .0831956
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b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
      chi2 (4) = (b-B)'[(V_b-V_B) ^ (-1)] (b-B)
           = 12.22
      Prob>chi2 =   0.0158
Source; Research data (2019)

The Hausman test results showed a Prob>chi2 of 0.0158 which sowed that the fixed effect model was the most appropriate for this study.

Correlation analysis in this study was conducted using Pearson's correlations analysis at 95% confidence interval and 5% confidence level 2-tailed test. The results of correlation analysis between interest rate risk and value of the firm were as shown in Table 4.

Table 4: Correlation Analysis

		value of the firm	Interest rate risk
Value of the firm		1.0000	
Interest rate risk	r	0.1827*	1.0000
	Sig	0.0002	

Source; Research data (2019)

The results in Table 4 showed that the correlation coefficient between interest rate risk and the value of the firm was 0.1827. These results were significant at 0.05 significance level. The results concurred with the observations of Landier, et al (2013) who concluded that variation in interest rates may adversely affect performance and value of financial institutions such as banks, microfinance institutions, and DTS. Likewise, the results agreed with the findings of Dell'Ariccia, Laeven and Marquez (2014) that movements in interest rates influence financial performance and value of commercial banks by changing the expected net interest income and expenses.

In regression analysis, value of the firm was regressed on interest rate risk and the results in Table 5 were obtained.

Table 5: Association between Interest Rate Risk and Value of the Firm

Source	SS	Df	MS		
				Number of obs	= 410
				F (1, 408)	= 653.060
Model	3114.867	1	3114.867	Prob > F	= 0.0002
Residual	1946.017	408	4.76965	R-squared	= 0.6155
				Adj R-squared	= 0.5310
Total	5060.884	409	12.3738	Root MSE	= 3.5176

Value of the firm	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
Interest rate risk	.22576	.01642	13.75	0.000	.0629821	.2015331
_cons	1.188928	.19212	6.19	0.000	.8112534	1.566603

Source; Research data (2019)

The results Table 5 showed that interest rate risk had a positive coefficient of 0.22576 meaning that holding all other factors constant, increasing fixed interest rate gap by one unit would lead to a 0.22576 increase in the value of the firm. At the same time, the results showed that coefficient for the constant was 1.188928 implying that if interest rate risk was held constant at zero value of DTS under SASRA would be equal to 1.188928. The model was summarised as follows:

Value of the Firm it = 1.188928+ 0.22576IRaRiit .... Equation 2

The results showed that P-value of interest rate risk was 0.000 which was less than the significance level of 0.05 and therefore the study concluded that interest rate risk has a significant effect on the value of the firm among DTS in Kenya. The results in Table 5 showed that the Adjusted R-squared was 0.5310 meaning that the model was able to predict 53.1% of the variations in the value of the firm. The F-statistic for the model was noted to be 653.060, which was higher than the F-critical of 3.8644. In addition, the study noted that the

P-value for the model was 0.0002, which was less than the significance level of 0.05. Based on these results the study concluded that the model was fit in predicting firm value.

Study results agreed with the findings of Landier, et al (2013) who noted that as the uncertainty on interest rates might adversely affect performance and value of financial institutions. Similar conclusions were reached by Dell'Ariccia, Laeven and Marquez (2014) that, although profitability of DTS may increase as a result of greater margin between the central bank's rate and the rates that are charged by a bank to its customers, changes in interest rates expose financial institutions to interest rates risk mainly because DTS issue interest-bearing deposits so that their profits decrease when rates go up resulting from increase in the compensation to depositors. The findings of Cao (2013) were also in line with the findings of this study. Cao indicated that lack of proper interest rate risk management by banks adversely affected the value of the banks.

CONCLUSIONS AND RECOMMENDATIONS

The study concluded that interest rate risk has a significant effect on value of the firm among DTS in Kenya. The study also deduced that variation in interest rates may adversely affect performance of DTS and that a unit increase in the interest rate gap would lead to positive change in value of the firm.

The conclusions made in this study are consistent with the provisions of trade-off theory as advanced by Kraus and Litzenberger (1973) which holds that an increase in the level of debt in the capital structure results in increased debt–equity ratio. Increase in interest rates leads to increase in interest tax shield and hence increase in firm value. The theory therefore holds that a firm's management decides on a target debt level by balancing the costs of bankruptcy associated with debt against the tax benefits of debt. Since interest rate risk was positively related to value of the firm, it shows that most DTS in Kenya did not rely on debt capital and mainly relied on capital contributed by members. As noted in this study a DTS relying heavily on use of debt is exposed to interest rate risk, which adversely affect its value. The theory thus explains how the level of debt in the capital structure influences the value of the firm.

The study therefore recommends that the management should consider interest rate variations and other elements that affect it carefully. In particular, the study recommends that the management should seek to increase fixed rate assets so as to reduce fixed interest rate gap as well as variable rate assets to increase variable rate gap.

Limitation of the Study

This study was conducted among DTS regulated by Sacco Societies Regulatory Authority. The results therefore suffer from generalizability since they may not be applicable to other SACCOs and financial institutions such as commercial banks that are not regulated by SASRA. Likewise, the findings of this study may not be adopted in other countries where SACCOs are not regulated. The analysis and conclusions reached in this study were limited

to data collected for a period of five-year period from year 2012 to year 2016. This period was selected because the SACCO regulator (SASRA) was already in effect. The results of the study therefore refer to this period only.

Suggestion for further research

This study was conducted among SACCOs registered and regulated by SASRA which are significantly controlled by the government. The results may therefore not be applicable to non-deposit taking SACCOs.

In addition, since these results were based on DTS, the study recommends that another study be conducted among other financial institutions such as microfinance institution and commercial banks in Kenya to determine if similar results would be obtained. Since the study established that there is a requirement of SACCOs having 15% of savings deposits to be in liquid assets it recommended that another study can be done on the influence of this requirement on the value of SACCOs.

Finally, since this study was based on DTS, which are private capital firms, the study finds that the level of regulation is lower than that of other public equity firms. For this reason, the level of compliance with international accounting and reporting standards is still low among SACCOs as compared to other financial sector firms such as public limited companies and commercial banks. Such firms have different regulating bodies such as Nairobi Securities Exchange and Capital Market Authority and a study should be conducted on such firms to establish if similar conclusion would be reached.

REFERENCES

Anania, P., Gikuri, A., & Hall, J. N. (2015). SACCOS and members‟ expectations: Factors affecting SACCOS capacity to meet members‟ expectations. In *A Paper Presented to the Co-operative Research Workshop held on 24th March*.

Askari, H., Iqbal, Z., & Mirakhor, A. (2011). *New Issues in Islamic Finance and Economics: Progress and Challenges* (Vol. 753). New Jersey, United States, John Wiley & Sons.

Baltagi, B. (2008). *Econometric analysis of panel data*. New Jersey, United States, John Wiley & Sons.

Basel Committee on Banking Supervision (2015). *Strengthening the resilience of the banking sector – consultative document, December.*

Cao, D. H. (2013). *Interest Rate Risk Management: Practices and Solutions in a Vietnamese Joint Stock Commercial Bank*. (Unpublished thesis), University of Applied Sciences, Germany.

Carneiro, L. A. F., & Sherris, M. (2008). Corporate interest rate risk management with derivatives in Australia: empirical results. *Revista Contabilidade & Financas*, *19*(46), 86-107.

Chan, N. H., & Wong, H. Y. (2015). *Simulation techniques in financial risk management.* John Wiley & Sons.

Christoffersen, P. F. (2012). *Elements of financial risk management.* Massachusetts: Academic Press.

Dell'Ariccia, G., Laeven, L., & Marquez, R. (2014). Real interest rates, leverage, and bank risk-taking. *Journal of Economic Theory*, *149*, 65-99.

Eckbo, B. E., & Kisser, M. (2015). Does dynamic trade off theory explain high-frequency debt issuers? *Review of Financial Studies*, *5*(7), 99-107.

Fitzpatrick, D. (2004). Modelling skin permeability in risk assessment—the future. *Chemosphere*, *55*(10), 1309-1314.

Frank, M. Z., & Goyal, V. K. (2009). Capital structure decisions: which factors are reliably important? *Financial management*, *38*(1), 1-37.

Githiomi, J. M., & Maina, S. (2016). Effects of Financial Risk Management on Financial Performance of Commercial Banks in Kenya. *Journal of Business and Management*, *1*(3), 55-63.

Hackbarth, D., Hennessy, C. A., & Leland, H. E. (2007). Can the trade-off theory explain debt structure? *Review of Financial Studies*, *20*(5), 1389-1428.

Harris, C. (2015). Financial Flexibility and Capital Structure. *Academy of Accounting and Financial Studies Journal*, *19*(2), 119.

Kraus, A., & Litzenberger, R. H. (1973). A state-preference model of optimal financial leverage. *The journal of finance*, *28*(4), 911-922.

Landier, A., Sraer, D., &Thesmar, D. (2013). *Banks' exposure to interest rate risk and the transmission of monetary policy* (No. w18857). National Bureau of Economic Research.

Mbai, A. M. (2006). *The relationship between interest rate risk and net interest income of commercial banks quoted at the Nairobi Stock Exchange.* (Doctoral dissertation), Kenyatta University, Kenya.

McNeil, A. J., Frey, R., & Embrechts, P. (2015). *Quantitative risk management: Concepts, techniques and tools.* New Jersey: Princeton university press.

Memmel, C., Seymen, A., &Teichert, M. (2017). Banks' Interest Rate Risk and Search for Yield: A Theoretical Rationale and Some Empirical Evidence. *German Economic Review*. 18(3), 71-79.

Minnis, M. (2011). The value of financial statement verification in debt financing: Evidence from private US firms. *Journal of Accounting Research*, *49*(2), 457-506.

Mwangi, G. N. (2012). *The effect of credit risk management on the financial performance of commercial banks in Kenya.* (Doctoral dissertation), Kenyatta University, Kenya

Mwanza, J. (2007). *The effect of derivative activities on interest rate risk exposure on banks listed at the Nairobi Stock Exchange.* (Doctoral dissertation), Kenyatta University, Kenya.

Neuman, W. L., & Robson, K. (2014). *Basics of social research*. Saskatoon: Pearson Canada.

Njenga, R., & Jagongo, A. (2019). Board characteristics, firm size and financial leverage of manufacturing firms listed at Nairobi Security Exchange, Kenya: Theoretical review. *International Academic Journal of Economics and Finance*, *3*(3), 418-426.

Ojukwu, M. O (2013). Impact of Educational Attainment on Marital Stability among Married Persons in Imo State, Nigeria. *International Journal of Education & Literacy Studies*, 4(3) 516-522.

Omasete, C. A. (2014). *The effect of risk management on financial performance of insurance companies in Kenya.* (Doctoral dissertation), University of Nairobi, Kenya.

Republic of Kenya (2016). The Kenyan banking industry: Challenges and sustainability. Supervision Annual Report 2015/2016, Special Issue: Republic of Kenya.

Sadgrove, K. (2016). *The complete guide to business risk management*. Abingdon: Routledge.

Sadgrove, K. (2016). *The complete guide to business risk management*. Abingdon: Routledge.

SASRA. (2019). *SACCO supervision annual report, 2015* (Deposit-taking SACCOs). Nairobi: Author.

Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill building approach*. New Jersey: John Wiley & Sons.

Taylor, S. J., Bogdan, R., & DeVault, M. (2015). *Introduction to qualitative research methods: A guidebook and resource*. New Jersey: John Wiley & Sons.

WOCCU (2018). Statistical Report 2018. Retrieved from https://www.woccu.org/our_network/statreport

World Bank Group. (2016). *World development report 2016: digital dividends*. World Bank Publications.

Zagonov, M. (2011). *Financial intermediation and interest rate risk*. (Unpublished Doctoral thesis), City University, London.