



## Effect of operational and market risk exposures on financial performance of DT-Saccos in Kenya

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### ABSTRACT

*The main aim of the investigation was to analyze the effect of operational and market risk exposures on the financial performance of DT-SACCOs in Kenya. The specific objectives of the study were to; assess the effect of operating expense risk exposure on the financial performance of DT-SACCOs in Kenya; To establish the effect of operation efficiency risk exposure on the financial performance of DT-SACCOs in Kenya; Effect of interest rate risk exposure on the financial performance of DT-SACCOs in Kenya; Effect of foreign exchange rate risk exposure on the financial performance of DT-SACCOs in Kenya. Effect of operational and market risk exposure on the financial performance of DT-SACCOs in Kenya. The study used panel data between the years 2010-2019 which was 10 years period. The results revealed that at both bivariate and multivariate regression operating expense risk, operating efficiency and foreign exchange risk exposure had a significant effect on the financial performance of DT-SACCOs in Kenya. Only interest rate risk exposure did not have a significant effect on the financial performance of DT-SACCOs in Kenya.*

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## Introduction

The Sacco Societies Act No. 14 of 2008 in the Laws of Kenya defines “deposit-taking business” as- (a) A Sacco business in which the person conducting the business holds himself out as accepting deposits on a day-to-day basis; and (b) Any other activity of the Sacco business which is financed, wholly or to a material extent, by lending or extending credit for the account and at the risk of the person accepting the deposit, including the provision of short-term loans to members. According to Bessinand O’Kelly, (2015) risk is an uncertainty measure of the future payoff of an investment, measured for some time horizon relative to a certain benchmark. This implies that risk is a measure that can be quantified especially when comparing two potential investments one would want to identify and desire the less risky investment.

Deposit Taking Savings and Credit Cooperative Societies (SACCO) societies in Kenya are exposed by both operational and market risks in the due course of conducting their business. According to Wolke (2017), operational risk entails the projection of loss as a result of scarce or neglecting processes, structures or guidelines. These may be occasioned by employee errors, systems failures or fraud. In order to manage such operation risk exposures, SACCOs should establish an operational risk control structure that suits the manner, measure and involvement of their processes to efficiently recognize, evaluate, monitor and mitigate operational risks (SASRA, 2017).

Market risk exposures on the other hand are the possible loss of fund due to hostile trends of interest rate, change in foreign rates, commodity prices and equity (McNeil et al., 2015). SASRA (2017) describes market risk as the danger of losing the SACCOs earning and capital from volatility of trends in rate of interest, foreign exchange rates and prices.

The main component of market risk that has an implication to SACCOs is the interest rate risk. Price risk only applies with relation to sensitive debt instruments (Hopkin, 2018). Interest rate risk for SACCOs arises from a mismatch between source of funding, debt

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and deposits and the loans which is propagated by mismatch between the time when rate changes and the time when the cash flows (price alteration risk). Changes in the rate of interest potentially alter prevailing organizations interest value associated to a specific asset and specific liabilities by making changes in present value of the future cash flows.

Deposit Taking (DT) SACCOs in Kenya are governed by Sacco Societies Regulatory Authority (SASRA) regulations meant to protect the members' investment. SASRA also educate SACCOs on risk exposure and the mitigation measures. The extent to which the SACCO societies in Kenya are exposed to both operation and market risks is not clear and how these risks impact on their financial performance is not adequately researched. The general objective of the study therefore was to examine the effect of operational and market risk exposures on financial performance of DT-SACCOs in Kenya. The study specifically aimed to; assess effect of operating expense risk exposure on financial performance of DT-SACCOs in Kenya; To establish effect of operation efficiency risk exposure on financial performance of DT-SACCOs in Kenya; Effect of interest rate risk exposure on financial performance of DT-SACCOs in Kenya; Effect of foreign exchange rate risk exposure on financial performance of DT-SACCOs in Kenya.

In order to attain the set objectives, the study tested the following hypotheses; HO<sub>1</sub>: Operating expense risk exposure does not significantly affect financial performance of DT-SACCOs in Kenya; HO<sub>2</sub>: Operating efficiency risk exposure does not significantly affect financial performance of DT-SACCOs in Kenya; HO<sub>3</sub>: Interest rate risk exposure does not significantly affect financial performance of DT-SACCOs in Kenya; HO<sub>4</sub>: Foreign exchange rate risk exposure does not significantly affect financial performance of DT-SACCOs in Kenya; HO<sub>5</sub>: Operating and Market Risk Exposure does not significantly affect financial performance of DT-SACCOs in Kenya.

## Literature Review

### Conceptual Background

#### *Operational Risk Exposures and Financial Performance*

The term operational risk became widely known in mid 1990s after the creation of proposals such as the Basel (II) in June 1999 and this was in perspective to rising scandals in the financial sector such as Nicholas Leeson, unscrupulous destruction of Barings bank in 1995 (Khan, 2008).

According to Khan (2008), operational risk losses have led to collapse of many financial institutions and estimated at US\$100 million in the recent years, this makes it the most significant risk organizations face. To counter this problem, many financial institutions have spent huge amount of funds in trying to create a vigorous framework for managing operational risk. According to Pwc (2014) report on operational risk appetite, operational risk is a universal fact often because of operating a business. In addition, it has been difficult to quantify compared to market and credit risk. Most operational risks arise from people incompetency and misuse of powers, failed processes during processing of information, transmission, and retrieval of data, and inaccuracy output.

Information Technology and systems may also lead to operational risk when there is a failure of the system, hacking, and programming errors thus causing losses to the institution (Strachnyi, 2016). Internal causes of operational risks include issues of insufficient processes, existing systems failures, poor hardware and software maintenance as well as errors in communication. External factors however, pertain to issues such as natural disasters, political disturbances, fraud as well as weak financial policies within the institutions (Barakat, 2014). In order to curb operational risk there is a need to implement a vigorous computerized solution as well as creation of well-outlined policies that recognize, monitor, evaluate, and eradicate all potential operational risks. Sound operational risk management solution such as strong internal controls, risk profiling, utilization of automated e-mail alerts, and notifications features may also be helpful (Barakat, 2014).

Despite the knowledge available on causes of operational risk, the major concern has however been that; there lacks a clearly recognized procedure to measure operational risk on a firm-wide basis (Lopez, 2002). On the other hand, some financial institutions have encountered failure due to inability to detect and act on new types of risks arising from introduction of fresh products or entry into new areas of business. According to Nair (2007) in the developed nations, operational risk management systems have continued to grow. This has led to many American and European financial institutions continued upgrading of their ORM systems. Other emerging market segments like in middle and Central America have had to invest in sophisticated ORM systems. This trend is attributed to a need to comply with the Basel II accord, which requires banks to invest in internal risk mitigation processes, data infrastructure, and analytical competences for enhanced growth and profitability.

#### *Market Risk and Financial Performance*

In the world a dominant source of income fluctuations to the financial institutions is market risk. Over time dimension of market threat becomes a key apprehension to enforcers and to risk control internal measures hence most monetary organizations with essential amount of trading movement prove to be exposed to excessive market movement sand. Market risk can be measured using the prevailing interest rate policy exercised by monetary policy bodies like the Central Banks and SACCO regulators. Market risk can be further measured using foreign exchange risk exposure, net interest margin and degree of financial leverage. According to Warzala, E. (1995), the risk can arise in situations financial institutions especially banks recognize financial instrument which are

highly bare to market cost instability as guarantee for loans. Price fluctuations and instability will increase and decrease in the day-to-day market (2012). Market risk therefore can cause very severe losses within a short period of time among volatile market conditions hence contribute to collapse among institutions in harsh situations. It is a peril within the organization occurring out of activities within market prices; for instance, variations originate from interest rates, foreign exchange rates and product prices.

Exchange rate, inflation and interest rate risks are form of market risk which has an impact on performance of banks across the entire industry. It is determined by different factors which affect the whole economy hence this makes it to be outside the control of most commercial banks. Degree of financial leverage, foreign exchange rate exposure and interest rate risk are used as indicators of market risk. Degree of financial leverage (DFL) is best used to help a company determine financial leverage risk. Most changes which might happen within the economic environment or among the interest rate will definitely have an extremely negative impact on how the business will evolve hence the higher the ratio is the riskier the firm is considered to be as it relies too much on debts. This is a measure of the degree of financial leverage.

#### *Financial Performance*

Financial performance consists of many different methods to assess how well an organization is using its assets to generate income (Richard, 2009). Common examples of financial performance comprise of operating income, earnings before interest and taxes, and net asset value. It is of great importance to note that no single measure of financial performance should be considered on its own. Rather, a thorough evaluation of a company's performance should take into account many different measures of its performance. Companies must evaluate and monitor their profitability levels periodically so as to measure their financial performance through use of the profitability measures computed from the measures explained above. The two most popular measures of profitability are ROE and ROA. ROE measures accounting earnings for a period per dollar of shareholders' equity while ROA measures return of each dollar invested in assets.

Financial performance is a subjective measure of how well a financial institution can use assets from its primary mode of business and generate revenues. This term is also used as a general measure of a firm's overall financial health over a given period of time, and can be used to compare similar firms across the same industry or to compare industries or sectors in aggregation (Pandey, 2008). Financial performance of a firm is the measure of the level of the organization's profit or losses within a specified period of time. Several measures have been used to measure the financial performance of financial institutions. These measures include: - Return on Equity (ROE), Return on Asset (ROA) and Net Interest Margin (NIM) (Murthy & Sree, 2003; Alexandru et al., 2008). Return on Equity (ROE) which is a financial ratio that refers to how much profit a company earns compared to the total amount of shareholder equity invested or found on the balance sheet. ROE is what the shareholders look in return for their investment. A business that has a high return on equity is more likely to be one that is capable of generating cash internally.

### **Theoretical Background**

#### **Theories Informing the Investigation**

##### *Risk Management Theory*

The risk management theory was developed by Pyle (1999) and centered on determining the significance of risk management as a practice. Since the theory was oriented to banking environment, the theorists considered particularly market risks and credit risks. Eichhorn (2004) observes that both market and credit risks yields direct and indirect impact on banks performance and sustainability. According to Rampini, Viswanathan, and Vuilleme (2019), the risk management approach considers market risk as a key contributor to value loss explained as the change in net value of asset. Key market factors that affect the value of assets include movements in interest rate, exchange rates, equities and commodity prices (Wu, Olson, & Dolgui, 2015). As observed by Eichhorn (2004), the theory challenges foundations of Markowitz of the modern portfolio theory which holds that risk of a portfolio can be considered as a sum of various risk components. As such, individual considerations for each component need to be effected. Proponents argue that portfolio risk is a function of portfolio return, a factor that is invariant to alterations in portfolio composition (VanHoose, 2017). Confronted with many investment options, managers should consider a tradeoff between the risks and returns associated with choice investments and make a decision that best serves the interest of shareholders (Saunders, Cornett, & McGraw, 2006). This theory was used to analyze the effect of operating expense risk and operational efficiency risk exposures on financial performance of DT-SACCOs in Kenya

##### *Foreign Exchange Exposure Theory*

Contemporary foreign exchange exposure theory (Shapiro, 2003) is of the opinion that exchange rate fluctuations should affect the value of a multinational company mainly via foreign sales and foreign (net) assets, which have to be denominated in the domestic currency of the parent company. Despite that, the earliest empirical studies on the topic (Levi, 2009; Jorion, 2010.), although focusing on companies with considerable operations abroad, fail to show a significant impact of fluctuations in exchange rates on the stock price of multinational companies. More recent studies (Bartov et al. 1996; Bodnar & Gentry, 1993), however, are more consistent with financial theory and find that exchange rate movements, through their effect on sales and net assets values, are an important factor in determining firm value. This theory underpinned the analysis of effect of foreign exchange rate risk exposure on financial performance of DT-SACCOs in Kenya.

### *Interest Rate Parity Theory*

Concept that any disparity in the interest rates of two countries is equalized by the movement in their currency exchange rates (Huang, 2009). This theory states that the interest rate differential between two countries is equal to the differential between the forward exchange rate and the spot exchange rate. Interest rate parity plays an essential role in foreign exchange markets, connecting interest rates, spot exchange rates and foreign exchange rates (Roll and Yan, 2000). Most importantly to our purpose, Bilson and Hsieh (1983), Huang (2009), have shown that the economic theory relating interest-rate differences among countries to subsequent exchange rate changes (uncovered interest-rate parity) seems to have broken down during the recent float. As a consequence, exchange-rate changes are no longer governed by international interest differentials. Hacche and Townsend (1981) and Meese and Rogoff (1983) have demonstrated that other plausible economic theories, such as purchasing power parity and the monetary model, also add little to random walk forecasts of exchange rates, at least at horizons of less than a year. These studies all reported strong rejections of uncovered interest-rate parity. Subsequent studies have confirmed these results. There is also an active theoretical literature, which attempts to determine if the failure of uncovered interest parity is due to risk aversion or market segmentation rather than market inefficiency. In contrast, Roll and Yan (2000) suggest that forward exchange rates are unbiased predictors of subsequent spot rates and there is really no forward premium puzzle. This theory informed the analysis of the effect of interest rate risk exposure on financial performance of DT-SACCOs in Kenya.

## **Empirical Review**

### **Operational Risk Exposure and Financial Performance**

Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk (Basel Committee on Banking Supervision, 2006). By this, all major drivers of operational risk are covered. People (human factor) can produce operational risk events through unintentional errors during work, criminal activities, insufficient training or number of employees, and bad management. External events, as a source of operational risk, comprise numerous events that result in physical damages on the bank property such as natural disasters (earthquakes, floods, volcanoes etc.) or catastrophes like wars, robberies or losses incurred by third parties. Risk events that are connected with IT system are relatively easy to detect although they vary from hardware malfunctioning to abuses of databases. Basel II defines Operational risk as the risk of loss resulting from inadequate or failed processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk. Legal risk includes, but is not limited to, exposure to fines, penalties, or punitive damages resulting from supervisory actions, as well as private settlements (Bank for International Settlements 2011). To manage this risk effectively, institutions should apply a top-down risk based view, assigning clear responsibility for all key operational risks. Effective governance also requires that sufficient talent is in place, covering all key operational risk and without impeding business execution (McKinsey work paper on risk 2012). The most difficult to identify and detect are potential operational risks embodied into internal processes and procedures. Unlike other mentioned major operational risk drivers, weaknesses of internal processes are still in a way ignored. All improvements in managing operational risk are mostly connected with countable and easily detected events. Internal processes weaknesses are less noticeable and strong commitment and willingness of management is required to recognize them and later on to solve. Special challenge regarding this type of risk driver is to recognize weaknesses that results from moral hazard problem and some authors propose changes in definition of operational risk in order to include it as integral part (Savic, 2012). Moral hazard is the consequence of existing information asymmetry on the financial markets. It occurs when the lender is subjected to the hazard in which the borrower has an incentive to engage in activities that are undesirable (immoral) from the lender's point of view, that is, activities that make it less likely that the loan will be repaid (Mishkin, 2006).

Special type of moral hazard risk is principal agent problem which occurs because managers (agents) have more information about investments than principals (owners) so they could have incentives to engage in activities that are not desirable for owners and expose the firm to the higher risk in order to make more profit and personal gains through bonuses for example. Operational risk is described as the risks of loss that arise from poor or failed in-house processes, workmanship and systems or external procedures. While the main component of risk management is to measure the scope and extent of an institutions risk exposures (Lopez, 2002), operational risk entails all risks, not covered by market and credit risk but have a measurable financial impact on the organization (Rippel & Teplý, 2011).

Most operational risks arise from people incompetency and misuse of powers, failed processes during processing of information, transmission, and retrieval of data, and inaccuracy output. Information Technology and systems may also lead to operational risk when there is a failure of the system, hacking, and programming errors thus causing losses to the institution (Strachnyi, 2016). Internal causes of operational risks include issues of insufficient processes, existing systems failures, poor hardware and software maintenance as well as errors in communication. External factors however, pertain to issues such as natural disasters, political disturbances, fraud as well as weak financial policies within the institutions (Barakat, 2014).

In larger banks, risk committee that specializes in the management of the bank's risks, and internal control system is set up for the role of observance of the risk, state of affairs and approaches taken for comprehensive risk identification, and maintenance of an efficient internal control system. Such a centralized risk-controlling unit has the authority to lay down pointers and strategies of risk

management (Bank For International Settlement, 2011). The forms of internal operational risks involve issues of human error in processing, fraud, missing a control step, disruption or system failures (software, hardware, telecommunications), act of sabotage or vandalism, noncompliance with law and regulatory requirements, external dispute with employee as a result of discrimination or harassment, new service or change in the current processes (Weber, 2014). These studies did not analyze the effect of operations risks and operational efficiency risk exposure in DT-SACCOs in Kenya which the current investigation analyzed and results presented in section 4.0 of the current paper.

### **Interest Rate Risk Exposure and Financial Performance**

In light of the uncertain course of interest rates, financial intermediaries face significant challenges in managing their interest rate exposures. Clearly, the impact of changes in market rates depends on the maturity and re-pricing mismatches embedded in institutions' assets, liabilities, and off-balance-sheet positions. In general, those institutions whose assets are expected to re-price faster than their liabilities--referred to as "asset sensitive"--would be expected to benefit from a rise in rates, because higher rates, holding everything else constant, should increase their net interest margins. Conversely, the net interest margins of "liability sensitive" institutions--those whose asset durations are longer than their liability durations--would be expected to be negatively affected by a rise in market interest rates (Kohn, 2010). The high and volatile nominal interest rates associated with contemporary inflation have prompted a pronounced change in commercial banks balance sheet. Low cost deposits have been replaced by alternative funding vehicles bearing high and increasingly variable interest rates (Budzeika 1980, Kane 1979& Silber 1977).

### **Sources of Interest rate risk**

Interest rate risk is the exposure of an institutions financial condition to adverse movements in interest rates. Some of the common sources of interest rate risk include;

#### *Re-pricing risk*

The primary and most often discussed form of interest rate risk arises from timing differences in the maturity (for fixed rate) and re-pricing (for floating) of assets, liabilities and off-balance sheet (OBS) positions. While such re-pricing mismatches are fundamental to the business of banking, they can expose a banking institution's income and underlying economic value to unanticipated fluctuations as interest rates vary.

#### *Yield curve risk*

Re-pricing mismatches can also expose a banking institution to changes in the slope and shape of the yield curve. In finance, the yield curve is a curve showing several yields or interest rates across different contract lengths (2mths, 2yrs, 20yrs etc) for a similar debt contract. The curve shows the relation between the (level of) interest rate (or cost of borrowing) and the time to maturity, known as the term of the debt for a given borrower in a given currency. Formal mathematical descriptions of this relation are often called term structure of interest rate. Yield curves are used by fixed income analysts, who analyze bonds and related securities, to understand conditions in financial markets and to seek trading opportunities. Economists use the curves to understand economic conditions.

#### *Basis risk*

This arises from imperfect correlation in the adjustment of the rates earned and paid on different instruments with otherwise similar re-pricing characteristics. When interest rates change, these differences can give rise to unexpected changes in the cash flow and earnings spread between assets and liabilities and OBS instruments of similar maturities or re-pricing frequencies.

#### *Optionality risk*

An additional and increasingly important source of interest rate risk arises from the options embedded in many banking institutions assets, liabilities and OBS position. Instruments with embedded options are generally most important in non-trading activities. They include various types of bonds and notes with call or put provisions, loans which give the borrowers the right to prepay balances and various types of non-maturity deposits instruments which give the depositor the right to withdraw funds at anytime, often without penalties. If not adequately managed, the asymmetrical payoff characteristics of instruments with optionality features can pose significant risk particularly to those who sell them, since the options held, both explicit and Interest Rate.

This has given rise to several perspectives for assessing interest rate risk exposure;

#### *Earnings Perspective*

The focus of analysis is the impact of change in interest rate on accrual or reported earnings. This is the traditional approach. Reduced earnings or outright losses can threaten the financial stability of an institution by undermining its capital adequacy and reducing market confidence. The component of earnings that has traditionally received the most attention is net interest income (Interest Income-Interest exposure). The percentage net interest income to the total income of the bank, would suggest the extend of the exposure to interest rate risk.

#### *Economic Value Perspective*

Variation in market interest rates can also affect the economic value of a banking institution's assets, liabilities and OBS positions. The economic value of an instrument represents an assessment of the present value of its expected net cash flows, discounted to reflect market rates. The economic value perspective reflects one view of the sensitivity of the net worth of the banking institution to fluctuations in interest rates. Since the economic value perspective considers the potential impact of interest rate changes on the present value of all future cash flows, it provides a more comprehensive view of the potential long term effects of changes in interest rates than offered by the earnings perspective.

#### *Embedded losses*

When evaluating the level of interest rate risk a banking institution is willing and able to assume, it should consider the impact that past interest rates may have on future performance. In particular, instruments that are not marked to market may already contain embedded gains or losses due to past rate movements. These gains or losses may be reflected over time in the banking institutions earnings. An example would be, a long term fixed rate loan entered into when interest rates were low and re-funded more recently with liabilities bearing a higher rate of interest will over its remaining life represent a drain on the banking institutions resources.

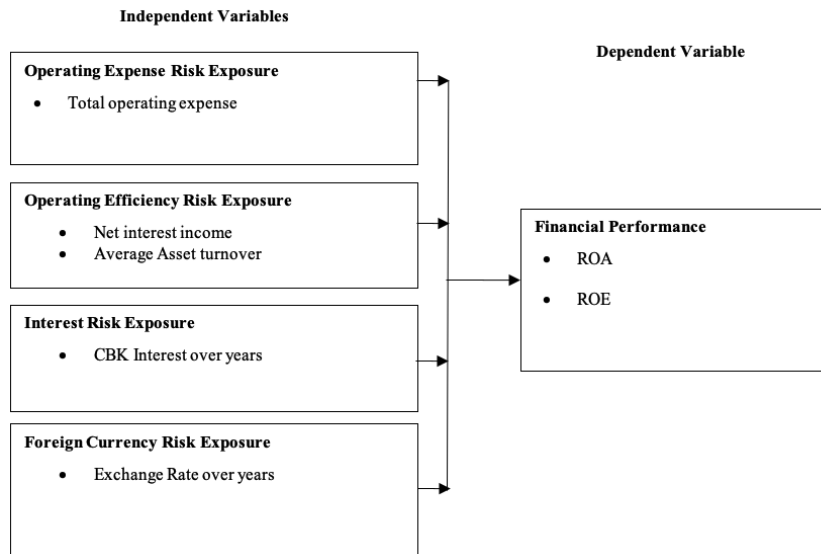
#### **Foreign Currency Risk Exposure and Financial Performance**

Griffin and Stulz (2001) find the effect of exchange rate shocks is minimal in explaining relative US industry financial performance and is even smaller in other countries that are more open to trade finding that industry effects are more significant than exchange rate effects. While there may be some differences in empirical findings, as Marston (2001) shows, foreign exchange exposure most likely depends on the competitive structure in an industry. It is widely believed that changes in exchange rates have important implications for financial decision-making and for the profitability of firms. One of the central motivations for the creation of the euro was to eliminate exchange rate risk to enable European firms to operate free from the uncertainties of changes in relative prices resulting from exchange rate movements. At the macro level, there is evidence that the creation of such currency unions results in a dramatic increase in bilateral trade (Frankel and Rose, 2002). But do changes in exchange rates have measurable effects on firms? The existing literature on the relationship between international stock prices (at the industry or firm level) and exchange rates finds only weak evidence of systematic exchange rate exposure (Griffin and Stulz, 2001). This is particularly true in studies of US firm share values and exchange rates. Bhatia (2004) made research on mitigating currency risk for investing in microfinance institutions in developing countries found that there is a clear trade-off for investors mitigating currency risk in least developed countries in the form of contract fees for the benefit of protection against currency fluctuations. The best financial instrument for investors interested in MFI's is currency options.

The technical, organizational and communication competencies of the top managers are the most important management dimensions to explain all financial results. Under this dimension of management, the professional skills of top managers must be emphasized. Therefore, the institutions were effective in risk management performance. Ahmed (2007) in the study of microfinance: realizing the social role of Islamic finance examined that the bank has to create various reserves to cover various risks arising due to the nature of its assets and liabilities since it positively contributes to risk management in microfinance. Some observations and suggestions stated that risk management has become more important now and its importance will continue to grow in the future. Factors such as the increasing competition in markets and the integration of new technology into the industry further reinforce the importance of risk management in banks. However, it is disturbing to note that systematic risk management is still not as widespread as it should be.

#### **Conceptual Framework**

A conceptual framework forms part of the agenda for negotiation to be scrutinized, tested, reviewed and reformed as a result of investigation and it explains the possible connections between the variables (Durham & Stokes, 2015). Conceptual frameworks are important to research as they clarify and integrate philosophical, methodological and pragmatic aspects of doctoral thesis while helping the profession to be seen as a research-based discipline, comfortable with the language of meta-theoretical debate, (Sykes & Piper, 2015). A conceptual framework for the present study shows the effect of operation and market risk exposure on financial performance of DT-SACCOs in Kenya and has been depicted in Figure 1 below.



**Figure 1:** Conceptual Framework

## Research and Methodology

### Target Population and Sampling

The study adopted a descriptive survey research design. Descriptive study is concerned with finding out who, what, where and how of the variables of the concerned research. The target population for this study comprised of the 176 Deposit Taking Saccos in Kenya. The sample size of 176 DT Saccos was obtained using coefficient of variation. Nassiuma (2000) asserts that in most surveys or experiments, a coefficient of variation in the range of 21% to 30% and a standard error in the range of 2% to 5% is usually acceptable.

$$S = \frac{N(Cv)^2}{(Cv)^2 + (N - 1)e^2}$$

Where S = the sample size

N = the population size

Cv = the Coefficient of Variation

e = standard error

Therefore, the sample size was:

$$S = \frac{176(0.21)^2}{0.21^2 + (176-1) 0.02^2}$$

$$= 68.04 \approx 68 \text{ DT Saccos}$$

The study then randomly picked 68 farmers from the universal population of 176 who were the main respondents to the study.

### Data Collection Procedures

Data on the independent variables was collected by use of secondary data, mainly from financial statements between 2010-2019, individual deposit taking SACCOS in Kenya under study. Miles, Huberman and Johnny (2014) characterized information accumulation in research as the way toward social event and estimating data on focused factors in set up methodical style which empowers the interviewee to draft applicable inquiries and decide the normal result. The data collection covered seven (10) year period from 2010 to 2019, this period of seven years was selected for the study in order to establish the changes in deposit taking SACCOS over time and to base the analysis on as recent data as possible.

**Data Analysis and Model Specifications**

Finally panel data model was used to test the significance of the influence of the independent variables on the dependent variable.

**Relationship between operation and market risk exposure and financial performance of DT-SACCOs in Kenya**

$$Y_{it} = \beta_0 + \beta_1 O\_Exp_{it} + \beta_2 O\_EFF_{it} + \beta_3 INT\_RATE_{it} + \beta_4 F\_EXCH\_RISK_{it} + \epsilon_{it}$$

$Y_{it(1,2)}$  = Financial Performance, where 1 is Returns on Asset, 2 Returns on Equity

$\beta_0$  is the time-invariant intercept

$O\_EXP_{it}$  = Operation Expense Risk Exposure,

$O\_EFF_{it}$  = Operation Efficiency Risk Exposure,

$INT\_RATE_{it}$  = Interest Rate Risk Exposure,

$F\_EXCH\_RISK_{it}$  = Foreign Exchange Rate Risk Exposure

$\epsilon_{it}$  = is an error term,

$i$  = Number of DT-SACCOs and  $t$  = refers to the time in years from the year 2010 to 2019, period of 10 years

**Findings and Discussions**

**Inferential Statistics Results**

The causal effect of the independent variables on the dependent variable was done using regression analysis based random effect model. This section therefore presents the results of the inferential statistics results of the effect of operational and market risk exposures on financial performance of DT-SACCOs in Kenya. First, the section presents the results of the bivariate regression analysis of the risks exposures on financial performance and lastly the multivariate regression results of all the four operational and market risk exposures and financial performance of DT-SACCOs in Kenya.

**Table 1:** Effect of the Operating Expense Risk Exposure on Financial Performance

	<b>Number of obs</b>	<b>200</b>				
	F( 1, 198)	6.59				
	Prob > F	0.011				
	R-squared	0.322				
	Adj R-squared	0.273				
	Root MSE	0.0372				
<b>roa</b>	<b>Coef.</b>	<b>Std. Err.</b>	<b>t</b>	<b>P&gt;t</b>	<b>[95% Conf.</b>	<b>Interval]</b>
$o\_exp$	-1.9811	7.71e-12	-2.57	0.011	-3.50E-11	-4.59E-12
$\_cons$	0.0240302	.003053	7.87	0.000	0.0180096	0.0300508

The study established a statistically significant effect of the Operating Expense Risk on Financial Performance of DT-SACCOs in Kenya ( $o\_exp \beta = -1.9811, p=0.0011$ ). The R-square for Financial Performance was found to be 0.322 indicating that 32% of the variance in Financial Performance can be explained by Operating Expense Risk. Therefore 68% of the variance in Financial Performance was explained by other factors outside this study (see Table 1). The F value for Operating Expense Risk was significant ( $F(1, 198) = 6.59, p=0.011$ ) implying that there is a significant effect of Operating Expense Risk on Financial Performance of DT-SACCOs in Kenya. Operating Expense Risk therefore could be used to predict the Financial Performance of DT-SACCOs in Kenya. This finding indicated that an increase in Operating Expense Risk by 1 unit will lead to a decrease in Financial Performance of DT-SACCOs in Kenya by 1.9811 multiple units. The regression models, therefore, can be used to predict Financial Performance of DT-SACCOs in Kenya is given by

$$Y = 0.0240302 - 1.9811 o\_exp + \epsilon \text{ where}$$

$Y$  = Financial Performance of DT-SACCOs in Kenya

$O\_exp$  = Operating Expense Risk



The null hypothesis **HO<sub>1</sub>**: Operating expense risk exposure does not significantly affect financial performance of DT-SACCOs in Kenya was therefore rejected at 0.05 level of significance and alternate hypothesis accepted. This finding implies that Operating expense risk exposure was a predictor of financial performance of DT-SACCOs in Kenya.

**Table 2:** Effect of the Operating Efficiency Risk Exposure on Financial Performance

					Number of obs	200
					F( 1, 198)	317.05
					Prob > F	0.000
					R-squared	0.6156
					Adj R-squared	0.6136
Total	0.283059977	199	.001422412	Root MSE		0.02344
roa	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
o_eff	0.1453	.0082	17.81	0.000	0.1292	0.1614
_cons	0.0025	.0023	1.13	0.260	-0.0018	0.0068

The study established a statistically significant effect of the Operating Efficiency Risk on Financial Performance of DT-SACCOs in Kenya (o\_eff β =0.1453, p=0.000). The R-square for Financial Performance was found to be 0.6165 indicating that 62% of the variance in Financial Performance can be explained by Operating Efficiency Risk. Therefore 38% of the variance in Financial Performance was explained by other factors outside this study (see Table 2). The F value for Operating Efficiency Risk was significant (F (1, 198) =317.05, p=0.011) implying that there is a significant effect of Operating Efficiency Risk on Financial Performance of DT-SACCOs in Kenya. Operating Efficiency Risk therefore could be used to predict the Financial Performance of DT-SACCOs in Kenya. This finding indicated that an increase in Operating Efficiency Risk by 1 unit will lead to an increase in Financial Performance of DT-SACCOs in Kenya by 0.1453 multiple units. The regression models, therefore, can be used to predict Financial Performance of DT-SACCOs in Kenya is given by

$$Y = 0.0025 + 0.1453o\_eff + \varepsilon \text{ where}$$

Y = Financial Performance of DT-SACCOs in Kenya

O\_eff = Operating Efficiency Risk

The null hypothesis **HO<sub>2</sub>**: Operating Efficiency Risk exposure does not significantly affect financial performance of DT-SACCOs in Kenya was therefore rejected at 0.05 level of significance and alternate hypothesis accepted. This finding implies that Operating Efficiency Risk exposure was a predictor of financial performance of DT-SACCOs in Kenya.

**Table 3:** Effect of the Interest Rate Risk on Financial Performance

					Number of obs	200
					F( 1, 198)	0.08
					Prob > F	0.7736
					R-squared	0.004
					Adj R-squared	-0.046
					Root MSE	0.0378
roa	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
int_risk	0.0002554	.0008866	0.29	0.774	-0.001493	0.0020037
_cons	0.0254306	.0093449	2.72	0.007	0.0070022	0.0438589

The study established did not establish statistically effect of the Interest Rate Risk Exposure on Financial Performance of DT-SACCOs in Kenya (int\_risk β =0.0002554, p=0.774). The R-square for Financial Performance was found to be 0.004 indicating that 0.4% of the variance in Financial Performance can be explained by Interest Rate Risk Exposure. Therefore 99.6% of the variance in Financial Performance was explained by other factors outside this study (see Table 3). The F value for Operating Efficiency Risk was significant (F (1, 198) =0.08, p=0.774) implying that there is insignificant effect of Interest Rate Risk Exposure on Financial

Performance of DT-SACCOs in Kenya. Interest Rate Risk Exposure therefore could not be used to predict the Financial Performance of DT-SACCOs in Kenya. The null hypothesis **HO<sub>3</sub>**: Interest Rate Risk Exposure does not significantly affect financial performance of DT-SACCOs in Kenya was therefore accepted at 0.05 level of significance and alternate hypothesis rejected. This finding implies that Interest Rate Risk Exposure was not a predictor of financial performance of DT-SACCOs in Kenya.

**Table 4:** Effect of the Foreign Rate Risk Exposure on Financial Performance

					Number of obs	200
					F( 1, 198)	4.05
					Prob > F	0.0455
					R-squared	0.201
					Adj R-squared	0.151
Total	0.283059977	199	.001422412		Root MSE	0.03743
roa	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
f_exch_risk	-0.0006886	.000342	-2.01	0.045	-0.0013631	-0.000014
_cons	0.0923737	.032082	2.88	0.004	0.0291071	0.1556403

The study established a statistically significant effect of the Foreign Exchange Risk Exposure on Financial Performance of DT-SACCOs in Kenya (f\_exch\_risk  $\beta = -0.0006886$ ,  $p = 0.045$ ). The R-square for Financial Performance was found to be 0.201 indicating that 20% of the variance in Financial Performance can be explained by Foreign Exchange Risk Exposure. Therefore 80% of the variance in Financial Performance was explained by other factors outside this study (see Table 2). The F value of Foreign Exchange Risk Exposure was significant (F (1, 198) = 4.05,  $p = 0.045$ ) implying that there is a significant effect of Foreign Exchange Risk Exposure on Financial Performance of DT-SACCOs in Kenya. Foreign Exchange Risk Exposure therefore could be used to predict the Financial Performance of DT-SACCOs in Kenya.

This finding indicated that an increase in Foreign Exchange Risk Exposure by 1 unit will lead to a decrease in Financial Performance of DT-SACCOs in Kenya by -0.0006886 multiple units. The regression models, therefore, can be used to predict Financial Performance of DT-SACCOs in Kenya is given by

$$Y = 0.0923737 - 0.0006886 \text{ f\_exch\_risk} + \varepsilon \text{ where}$$

Y = Financial Performance of DT-SACCOs in Kenya

O\_eff = Foreign Exchange Risk Exposure

The null hypothesis **HO<sub>4</sub>**: Foreign Exchange Risk Exposure does not significantly affect financial performance of DT-SACCOs in Kenya was therefore rejected at 0.05 level of significance and alternate hypothesis accepted. This finding implies that Foreign Exchange Risk Exposure was a predictor of financial performance of DT-SACCOs in Kenya.

**Table 5:** Effect of Operational and Market Risk Exposures on Financial Performance

					Number of obs	200
					F( 4, 195)	104.63
					Prob > F	0
					R-squared	0.6822
					Adj R-squared	0.6756
Total	0.283059977	199	.001422412		Root MSE	0.02148
roa	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
o_exp	-2.8111	4.53e-12	-6.21	0.000	-3.7011	-1.9211
o_eff	0.1467	.0075342	19.48	0.000	1.3201	1.6201
int_risk	0.0004	.0005069	0.96	0.337	-5.1204	1.4903
f_exch_risk	-0.0004	.0002001	-2.37	0.019	-8.694	-7.965
_cons	0.0359	.0191343	1.88	0.062	-1.7703	7.372

The study established a statistically significant effect of Operational and Market Risk Exposures on Financial Performance of DT-SACCOs in Kenya ( $p=0.000<0.05$ ). The R-square for Financial Performance was found to be 0.6822 indicating that 68% of the variance in Financial Performance can be explained by Operational and Market Risk Exposures. Therefore 32% of the variance in Financial Performance was explained by other factors outside this study (see Table 5). The F value of Operational and Market Risk Exposures was significant ( $F(4, 195) = 104.63, p=0.000$ ) implying that there is a significant effect of Operational and Market Risk Exposures on Financial Performance of DT-SACCOs in Kenya. Operational and Market Risk Exposures therefore could be used to predict the Financial Performance of DT-SACCOs in Kenya.

This finding indicated that an increase in Operating Expense Exposure by 1 unit will lead to a decrease in Financial Performance of DT-SACCOs in Kenya by 2.8111 multiple units. Findings on operational efficiency established that indicated that an increase in Operating Efficiency Exposure by 1 unit will lead to an increase in Financial Performance of DT-SACCOs in Kenya by 0.1467 multiple units. Third, an increase in Foreign Exchange Exposure by 1 unit will lead to a decrease in Financial Performance of DT-SACCOs in Kenya by -0.0004 multiple units. The regression models, therefore, can be used to predict Financial Performance of DT-SACCOs in Kenya is given by

$$Y = 0.0359 - 2.8111 \text{ o\_exp} + 0.1467 \text{ o\_eff} + 0.0004 \text{ int\_rate} - 0.0004 \text{ f\_exch\_risk} + \epsilon \text{ where}$$

Y = Financial Performance of DT-SACCOs in Kenya

O\_exp = Operating expense Risk Exposure

O\_eff = Operating Efficiency Risk Exposure

Int\_rate = Interest Rate Risk Exposure

O\_eff = Foreign Exchange Risk Exposure

The null hypothesis **H<sub>0</sub>**: Operating and Market Risk Exposure does not significantly affect financial performance of DT-SACCOs in Kenya was therefore rejected at 0.05 level of significance and alternate hypothesis accepted. This finding implies that Operating and Market Risk Exposure was a predictor of financial performance of DT-SACCOs in Kenya.

## Conclusions

The main objective of the study was to the effect of operational and market risk exposures on financial performance of DT-SACCOs in Kenya. The results revealed that at both bivariate and multivariate regression operating expense risk, operating efficiency and foreign exchange risk exposure had significant effect on financial performance of DT-SACCOs in Kenya. Only interest rate risk exposure did not have significant effect on financial performance of DT-SACCOs in Kenya. The study therefore concluded that operating expense risk, operating efficiency and foreign exchange risk exposure can be used to predict financial performance of DT-SACCOs in Kenya.

The results of this investigation can be applied by Sacco Societies Regulatory Authority (SASRA) in adopting policy that may help the Deposit Taking (DT) SACCOs absorb from the operation risk they are exposed to by tightening SACCOs' operational efficiency which had significant effect on the ROA. This study recommends that the Deposit Taking (DT) SACCOs should manage their operations effectively to avoid eventualities like insolvency and credit risk which can adversely affect SACCOs performance measured in terms of Returns on Asset (ROA). The Deposit Taking (DT) SACCOs in Kenya should strike a balance between borrowing and deposit rates to avoid credit exposure as well as liquidity exposure which are the challenges facing the Deposit Taking (DT) SACCOs sector.

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