SASRA MODERATION EFFECT BETWEEN FIRM CHARACTERISTICS AND FIRM EFFICIENCY OF DEPOSIT TAKING SAVINGS AND CREDIT COOPERATIVES SOCIETIES IN KENYA

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ABSTRACT

The Sacco regulatory authority reports that members' loans accounts 73.9 % of the industry total assets while share capital in these SACCOs depends on total deposits and the levy deposit rate. Empirical findings indicate that DTS have been inefficient with efficiency scores below one. Additionally, members of the SACCOs have been complaining of delay in loan disbursement contrasting to growing deposits levels. There lacks congruence on reviewed studies on why the sector is inefficient. This study sort to investigate the effect of firm characteristics on firm efficiency as solution to the registered inefficiency. The study was underpinned by financial intermediation theory, economic efficiency theory, capital structure theories, task technology fit theory, life cycle learning theory of the firm and neo institutional theory. The study adopted a positivist paradigm and causal research design. The study was survey in nature where quantitative data was extracted from all SACCOS audited financial reports between year 2015 to 2021.The target population was 176 deposit taking societies in Kenya as at 31st December 2021 and response rate was 100%. The study findings indicate that SACCOs efficiency has an increasing growth trend within the study period but is not optimal with variable return to scale contributing the highest levels in efficiency relative to scale efficiency, Capital structure does not significantly affect level of efficiency while technological investment has a negative but significant relationship to influence efficiency levels. SACCOs have maintained low levels of earning assets in adherence to regulation. Technological investment has significant but negative effect on the relationship between investment on technology and efficiency. The study recommends deposit taking savings and credit societies to formulate and implement long term survival strategies, put in place rebate payment policies as well as deposit collection strategies and government to reduce levies imposed on member's deposit in order to enhance efficiency levels.

Key words: SACCOs, Efficiency, Age, Earning Assets, Capital Structure

INTRODUCTION

Globally, Credit unions have an inefficient financial performance with varying efficiency scores depending on how large scaled or the institutional technological investment advancement (KPMG Financial Mutual Report, 2018). In Britain, the introduction of prudential rulebook in year 2016 with mandatory electronic reporting has led to an increase of credit unions inefficiency in submitting data for publication (Bank of England Credit Union Statistical Reports, 2018). Brazilian credit unions display a higher level of efficiency but low differentiation between credit unions in financial efficiency with a none consistent efficient trend throughout the financial period (Manuela, 2019).In Africa, credit unions total savings and share have accumulated to US dollars 21.54 billion (WOCCU Statistic reports, 2021). In addition, the report note that savings has accumulated to US dollars 17.091 billion. Total loans portfolio is at us dollars 14.05 million while total assets accumulated is worth US dollars 22.831 billion (WOCCU Statistic reports, 2021)

Kenyan government aims to ensure that the sector is fundamentally easy to access, efficient, stable and the customer is adequately protected through regulations set by SACCO authority (SASRA supervisory report, 2013). The authority targets to create a central liquidity facility and aims to improve the board training on the industry regulation requirements. According to SASRA supervisory report (2013), these regulations address four fundamental dimensions in SACCO sector on access, efficiency, customer protection and sector stability. Non adherence to these rules leads SASRA to impose restrictions, fines and penalties or revoke DTS operational license (SASRA regulations 2010, Sec 4).

When SASRA act was consented in year 2010, a four-year transition period was allowed from year 2010 to June 2014 to all deposit taking SACCOS to enable those SACCOS operating previously as deposit takers to adjust on capital adequacy requirements, divesture in non-core business and regularization on external borrowing. To objectively regulate the sector, a set of fourteen regulations to SACCOs were set out (SASRA regulation, 2010). According to SASRA supervisory report (2013), these regulations address four fundamental dimensions in SACCO sector on access, efficiency, customer protection and sector stability. Non adherence to these rules lead SASRA to impose restrictions, fines and penalties or revoke DTS operational license (SASRA regulations 2010, Sec 4). Subsequently, DTS advances loans to its members on condition that the loan issued will be paid within a specified period according to loan contract (Kiror, 2017).

According to SASRA regulations 2010, Reg.41 (1), DTS loans portfolios is classified according to their performance visa-viz the contractual period. However, Reg. 44(1) states that the DTS should review performance of such loans and ensure all delinquent loans are adequately provided for loan loss allowance. In 2018, SASRA issued circular guidance where the authority requires DTS to set aside funds by provisioning on loans portfolio outstanding over time. In addition, DTS have been affected greatly on their reporting timelines posing a mandatory requirement to report monthly on levels of capital adequacy, and investment reports (SASRA Supervisory Report, 2011).

Statement of the Problem

SACCOs contributes 2% of Kenyan GDP where output of members` loans account a 73.9% of the total industry asset size while input of members deposits forms the main source of financing. Generally, the sector has a growing inefficiency levels at an average of 22.5%, 31.3%, 32.3% and 27.8% for the period 2009-2013, 2011-2013 and 2012 to 2016 respectively (SASRA Supervisory report, 2020).Complaints on loan issuance and other short term obligations maintain relatively high levels at 24.69%,19.72% and 22.27% for years 2019, 2018 and 2020 respectively contrary to growing members` deposit contributions with an average paid interest on deposits declining from 7.1%, 6.72% and 6.01% from year 2017, 2019 and 2020 respectively. Related studies on efficiency notes importance of firm characteristics interplay with government regulations as suggested remedies to the sector`s anomaly (Mwangi, 2014, Kimutai,2019; Biwott, 2018) but fails to converge on the context of study, methodology, conceptualization of variables constructs and theoretical anchorage as suggested solutions. The gaps expose the area of study as inadequately addressed.

RESEARCH OBJECTIVE

The main objective of this study was to investigate the effect of firm characteristics (age of firm, technological investment, earning assets and technology on firm efficiency. Secondary, the study sort to assess whether SASRA regulations has a significant moderating effect between firm characteristics and firm efficiency in deposit taking SACCOS in Kenya.

Theoretical Literature Review

Various theories anchored the study. First, the study was anchored on Economic efficiency theorised by Debreu (1951) and premised on two hypotheses: Scale efficiency and X-efficiency. The proponent hypothesize that the better scaled firm is able to take advantage of production efficiency (technical efficiency) by employing all of its resources to produce optimally. The x- efficiency strand hypothesizes that firms which are well managed are able to control costs, lower costs and become more profitable moving towards the ideal possible production frontier. The x-efficiency strand is argued through the allocative efficiency (price) that the firm products should be priced well to enable the firm become efficient and profitable (Tsz-Yi,2011).The theory anchors firm efficiency construct that arises by better management of assets with proper use of technologies to improve the output. Secondary, capital structure discussions were anchored on MM theory (1958) which theorized that in efficient market dividend policies and capital structure were irrelevant to firm`s value and as reviewed on in their paper (MM, 1977) that cost of debt capital affected the firm value and hence the importance of debts in the firm.In addition, Kraus and litzenberger on tradeoff theory (1973) reemphasized need of the firm to achieve ideal capital structure mix and benefit owing to the tax deductibility hence the firm must strike a balance between financial costs arising from interest payable on that debt and tax deductible (tax shield). Pecking order theory by Myers and Mailuf (1984) added to the discussion of capital structure mix and theorized on the firm hierarchical financing options. In this study, the MM theory (1977) underscore the importance of debt financing (external borrowing) in SACCO financing model besides own members sources of fund (contribution in deposits, registration fees among others). Trade off theory (1973) under pins the need for the deposits (internal sources) and external borrowing balancing mix of funds by emphasizing on members contributing deposits which accrue less costs (levies) but are major contributors in funding DTS projects visa viz sourcing funds externally.

Empirical Review

The empirical literature section reviewed the previous undertaken studies which are related to the current study on the following variables:

Efficiency

Efficiency occurs when a firm produces maximum output using minimum firm inputs in comparison to other firms subject to production environment and constraint of resources (Kithinji, 2017). Organization production efficiency is measured using production frontier models either parametric or non-parametric by having production process with a specific production function or otherwise

respectively (Nyankomo & Aziakpono, 2015). Kenyan DTS are technically inefficient (Kalundu, 2019) with industry efficiency score of less than one (Kimutai, 2019). Objectively, DTS output has not been proportionately increasing with the increase in resources input with studies indicating that output in the industry could have been obtained by using less resources inputs than actually spent. Kenyan DTS efficiency levels varies with pure technical efficiency scoring lower than scale efficiency over the years (Kariuki, 2016).Objectively, large SACCOs have higher efficiency than small ones with efficiency ratios having a negative correlation with total asset size, capital adequacy and return on asset size (Njoroge, 2012; Onguka, 2012). Further, DTS with higher membership, loans advances and high turnovers are rated with more efficient scores (Ochola, 2016).

Firm characteristics

Acritical literature review on firm characteristics generally concludes that firm factors moderates relationship between equity and financial performance (Gatauwa, 2022).Additionally, Kipesha (2012) study findings concluded that age of the firm is associated with the firm experience in its endeavors where the firms which have been in operation for a longer period are expected to be more efficient in their operations (Magali & Joel, 2014). The age of the firm is measured by cumulative years that it has served its members or the oldest membership recorded in the SACCO (Dirar, 2017). DTS` Member credit utilization and loan service records have been used as a yardstick on how long the DTS has been in operation (Kiror, 2017).

Comparison among previous study findings differs on statistical significance of capital structure on efficiency. Capital structure has been studied in relation to its impact on financial performance but there is insufficient literature on its effect on DTS efficiency (Mirie, 2014). Empirical study's findings converge on importance of proper capital mix but fails to indicate the magnitude of the effect of the capital structure on their financial efficiency. For instant, study findings by Koech (2011) concludes that listed firms fund their activities through equity and debts while Armed (2017) study findings concluded that debt levels determine firm`s going concern.However, various reviewed studies did not indicate the magnitude of the effect of the capital structure on their financial efficiency. In addition, Kenyan firms have a slower speed of adjustment to targeted capital structure which eludes to higher operation costs and reduced profits margins (Mohammed & Tendai,2013).This contradicts study conclusions that in maximization of shareholders wealth, financial leverage plays a critical role (Ting et. al.,2017).Nevertheless, activities in SACCOs are funded from members' contribution which is in form of share capital, member deposits and interest income from other DTS investment projects (Kalundu, 2019). Objectively, poor and inadequate institutional capital in financing SACCOs projects has inhibited growth of SACCOs wealth sufficiently (Olando, 2012) while the ideal capital structure mix is a big challenge in Kenyan DTS (Ogweyi, 2014) affecting efficiency levels in DTS (Mirie, 2014).

In the finance literature, various studies such as Njau (2013) and Tsz-Yi (2011) examined the relationship between asset size and efficiency. Nevertheless, there exists a debate on the direction of the relationship between asset size and efficiency. Some scholars are on the opinion that large asset sized SACCOs have a higher cost efficiency score than small asset sized SACCOs with efficiency ratios having a negative correlation with total asset size and return on asset size (Njoroge,

2012; Onguka, 2012; Sangali, 2013) while other scholars concluded that asset size had no notable variance effect on efficiency levels in financial institution and that asset size has no statistical significant influence on firm`s efficiency (Karan & Shanshank, 2013).Asset size in different studies has been given a proxy of total asset size within the firm or deposit taking SACCOS (Njau, 2013 ; Kipesha, 2013). Subsequently, asset size as defined by total assets value within deposit taking SACCOs (Njau, 2013; Kipesha, 2013) guides in major decisions on debts and equity in the firm (Rashid, 2013).However, the untimely matching in maturities of assets that a firm has invested to liabilities maturities raises debt appetite in firms (Gul, Sajid & Mumrtaza, 2012).Objectively, in order to ensure firms processes are efficient, firms have employed technology in their operations by digitizing their operations (Mburu, 2015).This has however been challenged by increase of frauds particularly where adoption of mobile banking services are embraced in firms (Mugo, Muathe & Waithaka, 2019).

Various study findings on how efficiency and performance of financial institution are affected by technology concludes that enhancement of technology in financial transactions improves financial efficiency (Kariuki, 2016; Wamugo, Muathe & Waithaka, 2019). Most of the studies concentrated on how efficiency affects financial performance (Mutunga & Gatauwa,2021) but few on how factors unique to the specific DTS influence efficiency in DTS. In addition, the absorption of technology in deposit taking SACCOs is perceived as a great benefit to achievement of members welfare (Mburu, 2015).Notably, there was conceptual differences on how the construct technology has been measured in the various studies with some studies using level of capital expenditure on software and hardware (Mirie, 2014) while others proxy using members registered for M-banking services and customers or something that can be measured.

Study findings conclude that there is a positive statistical significance of SASRA regulation on DTS` financial issued with ATM cards (Njau, 2013).Generally, there lack convergence of thoughts on how to measure technology and whether its absorption in operations is a perceived benefit performance (Onguka, 2012).However, studies carried on effect of SASRA regulations on efficiency lacks congruency on their inferences whether DTS fully comply to SASRA regulations with some studies findings concluding that there is full compliance to regulation according to Mungai (2017) while other studies concludes that adherence on regulation on capital adequacy negatively influences technical efficiency and DTS fully compliance to regulations and adherence to SASRA regulations dependent on the DTS asset size (Biwott & Muturi, 2018).Generally, the studies lack conclusive evidence whether SASRA regulation moderates the level of efficiency or its adherence is based on asset size.

Conceptual Framework

The conceptual framework sort to a diagrammatically represent the relationship between firm characteristics, SASRA regulations moderation variable on DTS efficiency.

RESEARCH DESIGN

The research study employed causal research design to enable the researcher to assess objectively the nature and effect of the relationship between independent, mediating moderating and dependent variables (Mirie, 2014). The study extracted attributes of interest from DTS audited financial reports which improves research inferences reliability for generalization purposes The time horizon was longitudinal between year 2015 to 2021 on DTS which were active within the period under review. The study locale was in Kenya.The study analysis ensured goodness fit of the data for hypothesis testing and ensured validity, reliability and generalization of study results findings. The study employed ratio level of measurement.

Target population

The population which consists elements making the subjects from where representative sample was drawn to inform the study findings (Saunders et al.,2009) was all 176 active DTS in Kenya as at 31 December 2021(SASRA Supervisory Report, 2021).The period under consideration (2015-2021) was one year after the SASRA Act (2014) came into force after being enacted by the Kenyan government in 2008 (SASRA Act, 2008; SASRA Regulations, 2010).

Research Hypothesis

The study aimed to test the following null hypothesis:

1.H_{01} Capital structure does not have a significant effect on firm efficiency

2. H_{02} Age of DTS structure does not have a significant effect on firm efficiency

3. H_{03} Technological investment does not have a significant effect on firm efficiency

4. H_{04} Size of DTS does not have a significant effect on firm efficiency

5. $H_{05\ SASRA}$ Regulation does not have a significant effect on the relationship between firm characteristics and firm efficiency

Empirical Models

This study run a step wise analysis by first computing efficiency scores using Data envelopment analysis and running a tobit regression in the second stage.

$EFF_{it} = \beta_0 + \beta_1 CS_{it} + \beta_2 AGE_{it} + \beta_3 Asset\ size_{it} + \beta_4 TEC_{it} + \varepsilon_{it}$

Source: Author (2024)

Where CS (capital structure) and Tec (technological investment) for i (Sacco) and t (year) and EFF (efficiency score which is censored between 0 and one ($EFF \leq 1$).

Moderation Test Decision Making Criteria

The study run Tobit regression model and compared the rho value between a model with a moderator variable and a model without moderating variable. As the rule of thumb, if the model with moderating variable has a higher rho value in comparison to the model without moderating variable, the moderator is strong and indicates that moderating variable has a strong moderating effect on the relationship between firm characteristics and efficiency, otherwise not. The study

considered the p-values and coefficients of the models to conclude on the significance and strength and direction of the moderating effect on the specific variables.

Empirical model	Testing	Decision making
1.EFF_{it} = $\beta_0 + \beta_1 CS_{it} + \beta_2 AGE_{it} + \beta_3$Asset size$_{it} + \beta_4 TEC_{it} + \varepsilon_{it}$ **2.EFF_{it}** = $\beta_0 + \beta_1 CS_{it} + \beta_2 AGE_{it} + \beta_3$Asset size$_{it} + \beta_4 TEC_{it} + \beta_5\{CS_{it}*SR\} + \beta_6\{AGE_{it}*SR\} + \beta_7\{$Assetsize$_{it}*SR\} + \beta_8\{TEC_{it}*SR\} + \varepsilon_{it}$	$Rh0_1 \leq Rh0_2$ P<0.05%	SASRA Regulations is a good moderator.

Source: Author (2024)

where EFF_{it} = is efficiency of firm i at time,t ; CS_{it} Capital structure of DTS i at time,t and ε_{it} – Random error term at time t

Data collection Instrument

A document review guide was used in this study to extract secondary quantitative data from published audited financial reports of DTS in Kenya from year 2015 to 2021.

RESULTS AND DISCUSSIONS

This section presents results on descriptive and inferential analysis

Efficiency Scores

Table 4.1 summarizes year 2015 to 2021 technical efficiency scores measured in CRS (constant return to scale), VRSTE (variable return to scale) and scale efficiency. DTS is said to operate under CRS if the desired results increase or decreases proportionately to increase and decrease of the input and output of the production model. DTS are said to be operating at variable return to scale if an increase of input does not proportionately reflect increase in its output. DTS `s loans issued are a multiple of members deposits (Mutinda, 2018) thus gross loans do not match proportionately to deposits accumulated. Based on this assumption, the study adopted VRSTE but summarized all the scores on yearly basis as discussed below to have a better understanding of DTS` efficiency generally.

Table 4.1 indicates that DTS had a mean of 0.931 on VRSTE and 0.913 on CRS indicating that DTS are not optimally efficient. Objectively, DTS are expected to reduce usage of deposits (inputs) by 6.9% but retain same level of loans issuance or increase gross loan (output) by 6.9% using the same level of deposits in order to operate efficiently. The variable return to scale had an increasing tend from 0.928 in 2015 to 0.929 in 2017 and 0.932 and 0.935 in 2020 and 2021 respectively. This shows that as the DTS grew in deposits collections over the years, their efficiency in issuance of loans improved which corroborate with findings by Biwott and Muturi (2018). This indicates that the loans advanced grew at a higher level than the members deposit received by the Saccos. The growth may be well explained by increase in supervision by government through SACCOs regulatory authority which was assented into and started implementation in year 2014 (SASRA Supervisory report,2016; Ting et al.,2017).

Constant return to scale (CRS) over the period had a constant trend of 0.911 from year 2015 to 2019 to a slight increase in 2021.Generally, the CRS maintained at an average of 0.911 over the period of the study indicating that the DTS ratio of gross loans and deposits received was at constant ratio and were inefficient over the study period at 0.089%. Similarly, the scale efficiency grew at constant rate at 0.913 from year 2015 to 2020 with a slight increase to 0.912 in year 2021.This constant efficiency scores indicate that the changes in DTS size did not have significant change over the period. At an average, the scale efficiency was 0.913 indicating that the DTS were inefficient with 0.087%. Generally, the findings indicate that the inefficiency in the sector majorly results from variable return to scale (deposits from members and loans issuance) and CRS (constant return to scale) (Kimutai ,2019) but not from scale, that is the size of the DTS. Subsequently, the study employed variable return scale in its subsequent analysis.

Table 1: Technical and Scale Efficiency

Year	VRS	CRS	SCALE
2015	0.928	0.911	0.914
2016	0.929	0.911	0.913
2017	0.929	0.911	0.913
2018	0.93	0.911	0.913
2019	0.932	0.911	0.913
2020	0.932	0.91	0.913
2021	0.935	0.912	0.914
Mean	0.931	0.911	0.913

Source : Author (2024)

Bias corrected efficiency Scores

In the second stage, firm characteristics are regressed with efficiency scores computed using DEA model which suffers from inherent dependency problem (Farrel,1957;Charnes Cooper& Rhodes,1978) which violates assumption of within sample independency in linear regression analysis (Morwab& Muturi,2019).Before regressing, the study cured dependency problem by running bootstraps (Efron, 1979) using Stata software on variable return to scale and generated biased corrected efficiency scores on resampled estimates as summarized on table 2

Year	*VRS*	*BiasCorrected VRS*
2015	*0.928*	*0.923*
2016	*0.929*	*0.924*
2017	*0.929*	*0.925*
2018	*0.93*	*0.926*
2019	*0.932*	*0.926*
2020	*0.932*	*0.926*
2021	*0.9310.*	*0.926*
Mean	*0.931*	*0.926*

Source: Author (2024)

Table 4.2 depicts a lower average mean computed on bias corrected score in comparison to mean VRS (variable return to scale) computed efficiency scores. This can be attributed to sampling bias when generating efficiency scores using DEA model hence the study adopted the bias corrected efficiency scores in the second stage to carry out regression analysis.

Descriptive Analysis

Descriptive analysis was carried out to ascertain nature of the collected data properties as a precursor to inferential analysis (Mwangi, 2014).

Table 2 Summary on descriptive statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Bias_Corrected_Eff	1157	.84	1.00	.9256	.02765
d_AGE	1156	2	59	34.40	12.246
D_capstructure	1157	1078885.753	2952176919	186255147.2	357615750.0
Sizeof_DTS	1157	.77	1.07	.9220	.04773
Techinvest	1157	.1700	3.5200	1.844589	.5326981
d_deposit levy* 0.1%	1157	370.5615	13676135.17	1986549.190	2762168.409
LQD_Ratio	1157	.1006	.3450	.183917	.0515432
Valid N (listwise)	1156				

Source : Author (2024)

The summary table 3 indicate that minimum and maximum efficiency scores is 0.84 and 1 respectively interpreting that the dependent variable is censored with the highest efficiency score being one .In addition , the mean score of less than one indicate that DTS are inefficient and are not optimal in their utilization of deposits to advance loan facility. Bias corrected efficiency score had a mean of 0.925 and a standard deviation of 0.027 indicating that DTS are inefficient. DTS requires to increase issuance of loans by 7.5 % using the same level of deposits for the sector to be optimally efficient. The mean age of active DTS was 34.43 years with a standard deviation of 12.24 years indicating that the age distribution is spread out with plus or minus 12.24 years from the mean. Additional DTS age had a wide range of 57years computed as difference between maximum (59 years) and minimum (2years) of existence. This indicate that DTS were licensed and supervised by SASRA at different years.The Minimum and maximum capital structure was 10.0788 million and 2.952 billion with a mean capital structure of 186.255 million and standard deviation of 357.6575 million. The mean capital structure was 186.255 million with a standard deviation of 357.6million with a minimum and maximum of 1.079m and 2.95 billion respectively which indicate that DTS sets aside funds for capital expenditure and provisional amounts varies from one DTS to another. The varying capital expenditures allocation can be explained by SASRA categorization of SACCOs into large, medium and small tiers based on their asset size levels (Kalundu,2019) and limitation on how much a DTS can spend on capital expenditures (SASRA Act,2008) hence their ability to allocate funds on capital expenditures varies.

DTS have a technological investment mean score of 1.84 and standard deviation of 0.533 with a maximum and minimum technological investment of 0.17 and 3.52 respectively. This indicates that at an average DTS have embraced technology 1.84 times of their total capital expenditures where

the most and least technologically funded was 3.52 and 0.17 times their capital expenditures. This wide range may be explained by levels of differentiated capital structures where high leveraged DTS employs more resources in to technology in comparison to their peers. Generally, DTS have implemented directives and embraced technology to digitize their operations (Mburu,2015).DTS` have a mean liquidity ratio of 18.39 which is above SASRA required liquidity threshold of 15% (Kimutai,2019) indicating that DTS are liquid and can meet their obligations as they fall due though there is a general concern that they are not able to meet members loans` demand occasionally (SASRA, 2016). The claim may be explained by poor recovery strategies on issued loans leading to most of the loans payment default and thus constrain on their liquidity levels. At an average the mean amount of funds levied by SASRA on members deposits was 1.99million from each DTS with a maximum and minimum amount collected from DTS being 13.68million and 0.37 million respectively. This indicates that DTS have a wide difference in their deposits levels perhaps based on their membership levels and contributions and their period of existence in the market hence differences on their deposit's levels.

Tobit Regression

Employing a panel Tobit regression model, the study aimed to determine the hypothesized statistical significance of the relationship between firm characteristics and efficiency. The interpretations and discussions of the study findings on specific objectives are based on a 5% significance level

Table 4.4 Model Summary on Joint effect of Firm Characteristics on Firm Efficiency in Deposit Taking Saving and Credit Cooperative Societies in Kenya.

```
Random-effects tobit regression                 Number of obs      =       1157
Group variable: Sacc0_id                        Number of groups   =        176

Random effects u_i ~ Gaussian                   Obs per group: min =          1
                                                               avg =        6.6
                                                               max =          7

Integration method: mvaghermite                 Integration points =         12

                                                Wald chi2(4)       =     101.43
Log likelihood  =   3217.488                    Prob > chi2        =     0.0000
```

Bias_Corrected_Eff	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Capital_Structure	.0119748	.008893	1.35	0.178	-.0054552	.0294048
Age_DTS	.0005381	.0000916	5.88	0.000	.0003586	.0007177
Techinvest	-.0037626	.0009344	-4.03	0.000	-.0055941	-.0019311
Sizeof_DTS	-.2529086	.1241167	-2.04	0.042	-.4961729	-.0096443
_cons	1.137477	.1076154	10.57	0.000	.9265544	1.348399
/sigma_u	.0234572	.0013	18.04	0.000	.0209092	.0260051
/sigma_e	.011343	.0002571	44.11	0.000	.0108391	.011847
rho	.810482	.0184834			.7721562	.844561

```
  Observation summary:         0  left-censored observations
                            1150     uncensored observations
                               7 right-censored observations
```

Source: Author (2024)

The Tobit regression results presented in Table 4 demonstrate a robust fit of the model, with bias-corrected efficiency as the dependent variable. Independent variables, such as technological investment, capital structure, size, and the age of DTS, collectively account for significant variations in the dependent variable. The Wald chi-square test yielded a value of 101.43 with 4

degrees of freedom, resulting in a highly significant p-value of 0.000 at a 95% confidence level. At the 95% confidence level, the study rejected three out of four null hypotheses. Notably, the null hypothesis asserting the lack of statistical significance of firm characteristics on efficiency was rejected, except for capital structure, which did not exhibit statistical significance. Specifically, technological investment and DTS size demonstrated a negative relationship with efficiency, while capital structure showed a positive but non-significant relationship. The age of DTS exhibited a positive and statistically significant relationship with efficiency. The estimated standard deviation of random effects (sigma_u) across groups is 0.023365, and the standard deviation of residual errors (sigma_e) is 0.01134. The proportion of total variance attributable to random effects (rho) is 0.80936, indicating that major variations in the dependent variable result from differences across groups rather than within.

Test Results on Hypothesis

The study explored the relationship between capital structure and efficiency, obtaining a p-value of 0.178, exceeding the 0.05 significance level. Consequently, the null hypothesis (H01) was accepted, indicating that capital structure does not significantly affect firm efficiency in deposit-taking savings and credit cooperative societies (DTS) in Kenya. This finding contrasts with some studies suggesting a significant impact of capital structure on efficiency. The study investigated the relationship between the age of DTS and efficiency, revealing a positive coefficient of 0.0005381 (p-value 0.000), indicating a statistically significant relationship. This aligns with prior studies indicating a positive correlation between the age of cooperatives and efficiency performance. The findings is consistent with life cycle learning theory by Jovanovic (1982) which presupposes that true managerial abilities, entrepreneurial activities and higher levels of certainties on investment decisions success characterizes the firm who have experience over time contrary to business starters (Jovanovic,1982). This preposition is consistent with findings that firms which underestimate their abilities expand production along their subsequent production periods in future (Sirojuzilam, Zuhandi & Muda, 2021). These firms learn their real abilities through observation of real business world on how well they have performed after a given period of time (Tsz-Yi, 2011).

Examining the relationship between technological investment and efficiency revealed a negative coefficient of -0.0037626 (p-value 0.000), indicating a statistically significant relationship. This finding supports previous studies that have highlighted that technology adoption has a direct effect on efficiency (Liu, 2019). The negative coefficient score corroborates with study findings that a firm total production costs are spread across on its output which determine a firms production efficiency (Mirie, 2014). The negative relationship however can be explained by the possible costs arising from the maintenance costs of the software, amortization provision and depreciation of the hardware. However, results contradict the technology fit theory that relevant link between task and technology fit impact organizational performance positively through communication support for the structuring of meetings, workflows, and support for information processing (Zigurs & Buckland, 1998). Additionally, the study contradicts research findings that enhancement of technology in financial transactions improves financial efficiency (Kariuki, 2016; Wamugo, Muathe & Waithaka, 2019). The study assessed the relationship between asset size and firm efficiency and findings resulted in a negative coefficient of 0.2529 (p-value 0.042), indicating a statistically significant

relationship. This findings reaffirms the research study conclusions that asset size have a negative correlation to efficiency ratios (Njoroge, 2012; Sangali, 2013).However, the findings contradicts the economic efficiency theory by Debreu (1951) that the better scaled firms are more efficient in that they achieve better scale of operations hence lowering costs and results to more profits than other firms (Debreu,1951).Further, the findings contradicts findings that asset size has no statistical significant influence on firm`s efficiency (Karan & Shanshank, 2013).

Marginal Effects after Tobit Regression

Tobit regression coefficients are not interpretable. In order to objectively interpret the tobit coefficients output, the study run marginal effects analysis after tobit regression and marginal constant intercept as presented on table 4.16 and 4.17 respectively.

Table 51 *Marginal Effects After Tobit Regression*

```
. margins, dydx (Capital_Structure Age_DTS Techinvest Sizeof_DTS)

Average marginal effects                        Number of obs   =       1157
Model VCE    : OIM

Expression   : Linear prediction, predict()
dy/dx w.r.t. : Capital_Structure Age_DTS Techinvest Sizeof_DTS
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Capital_Structure	.0119748	.008893	1.35	0.178	-.0054552	.0294048
Age_DTS	.0005381	.0000916	5.88	0.000	.0003586	.0007177
Techinvest	-.0037626	.0009344	-4.03	0.000	-.0055941	-.0019311
Sizeof_DTS	-.2529086	.1241167	-2.04	0.042	-.4961729	-.0096443

Source: Author (2024)

Table 6 Computing of the marginal constant intercept

```
. margins, dydx(_cons)

Predictive margins                              Number of obs   =       1157
Model VCE    : OIM

Expression   : Linear prediction, predict()
```

	Delta-method Margin	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_cons	.9252289	.0017957	515.25	0.000	.9217094	.9287483

Source: Author (2024)

In view of table 4.5 and table 4.6, the following model is formulated:

Eff= 0.9252289 + 0.0005381Age -0.0037626Tec - 0.2529086Size +…..ε_{it}

From the table 6 results analysis, age of DTS ` coefficient was at 0.0005381 which indicate a positive and statistically significant relationship between age of DTS and firm efficiency. Further, the coefficient shows that a unit increase in age of DTS leads to an increase of DTS efficiency by 0.0005381 units holding other variables constant. This interprets that aging of DTS by one year

improves DTS` efficiency levels. Technological investment`s coefficient was at – 0.0037626 which indicate a negative and statistically significant relationship between technological investment and firm efficiency. The coefficient indicate that a unit increase in technological investments leads to a decrease in DTS efficiency by 0.0037626 units holding other variables constant. This interprets that by spending more funds in technological investment, efficiency decreases by 0.0037626 units holding other variables constant.

Size of DTS`s coefficient was at – 0.2529086 which indicate a negative and statistically significant relationship between size of DTS and firm efficiency. The coefficient indicate that a unit increase in Size of DTS`s leads to a decrease in DTS efficiency by 0.2529086 units holding other variables constant. This interprets that by DTS spending more funds to own more assets, efficiency decreases by 0.2529086 units holding other variables constant.

Moderating Effect of SASRA Regulation Between Firm Characteristics and Efficiency

Table 7 Tobit regression with SASRA regulation as an independent variable.

```
Random-effects tobit regression                 Number of obs      =      1157
Group variable: Sacc0_id                        Number of groups   =       176

Random effects u_i ~ Gaussian                   Obs per group: min =         1
                                                               avg =       6.6
                                                               max =         7

Integration method: mvaghermite                 Integration points =        12

                                                Wald chi2(5)       =    140.90
Log likelihood  =   3235.303                    Prob > chi2        =    0.0000
```

Bias_Corrected_Eff	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Capital_Structure	.0143545	.0089811	1.60	0.110	-.0032481	.0319572
Age_DTS	.000208	.0000999	2.08	0.037	.0000122	.0004038
Techinvest	-.0036035	.0009356	-3.85	0.000	-.0054372	-.0017697
Sizeof_DTS	-.2928338	.1254033	-2.34	0.020	-.5386198	-.0470478
SRSASRALEVY	.0103253	.0016555	6.24	0.000	.0070806	.01357
_cons	1.123379	.1086096	10.34	0.000	.9105077	1.33625
/sigma_u	.0198396	.0012076	16.43	0.000	.0174728	.0222064
/sigma_e	.0114617	.0002636	43.48	0.000	.010945	.0119783
rho	.7497615	.0250735			.6981791	.796252

```
Observation summary:         0  left-censored observations
                          1150     uncensored observations
                             7 right-censored observations
```

Source : Author (2024)

The output in Table 8 reveals a Wald chi-square value of 140.90 with 5 degrees of freedom, resulting in a statistically significant p-value of 0.000, below the significance level of 0.05. This indicates that the Tobit regression model is well-fitted to the dependent variable (bias-corrected efficiency) and the five variables, including the firm characteristics and SASRA regulation construct. The chi-square coefficient's significance at a 95% confidence level is affirmed, leading to the rejection of the null hypothesis that the coefficients in the model are equal to zero.

Notably, including the moderating variable as an independent variable reduced the rho value from 0.80936 to 0.7497615. This implies a decrease in the proportion of total variance represented in the efficiency (dependent variable) attributable to random effects, dropping from 80.936% to 74.976%. This suggests that the major variations in the dependent variable resulting from differences across groups decreased by 5.96%, indicating that adding the variable did not enhance the model compared

to the original model. Objectively, SASRA regulations exhibit a statistically significant effect on the efficiency of DTS, while capital structure does not achieve statistical significance. In summary, the capital structure shows a positive but non-significant relationship with efficiency technological investment, and the size of DTS displays a negative but significant relationship with efficiency, while the age of DTS and SASRA regulation has a positive and significant relationship with efficiency.

Table 8 Marginal effect after Tobit regression with SASRA Regulation as an Independent Variable.

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Capital_Structure	.0143545	.0089811	1.60	0.110	-.0032481	.0319572
Age_DTS	.000208	.0000999	2.08	0.037	.0000122	.0004038
Techinvest	-.0036035	.0009356	-3.85	0.000	-.0054372	-.0017697
Sizeof_DTS	-.2928338	.1254033	-2.34	0.020	-.5386198	-.0470478
SRSASRALEVY	.0103253	.0016555	6.24	0.000	.0070806	.01357

Source: Author (2024)

Table 9 Computing of the Marginal Constant Intercept

```
. margins, dydx(_cons)

Predictive margins                              Number of obs   =       1157
Model VCE    : OIM

Expression   : Linear prediction, predict()
```

	Delta-method Margin	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_cons	.9254378	.0015111	612.41	0.000	.922476	.9283996

Source: Author (2024)

From the table 8 and 9 the following model was extracted

Eff = 0.9254378 +0.000208Age – 0.0036035 Tec -0.2928338Size+0.0103253 SasraReg +… ε_{it}

Where, AGE = age of DTS, Size= size of DTS, Tec= Technological investment, SasraReg = SASRA regulation and ε_{it} = Error term at time t, and firm i

The coefficient for the age of DTS was 0.000208, indicating a positive and statistically significant relationship between the age of DTS and firm efficiency. A positive coefficient implies that a one-unit increase in the age of DTS results in a 0.000208 unit increase in DTS efficiency, holding other variables constant. Conversely, the coefficient for technological investment was -0.0036035, signifying a negative and statistically significant relationship with firm efficiency. This negative coefficient suggests that a one-unit increase in technological investments decreases DTS efficiency by 0.0036035 units while keeping other variables constant. The coefficient for the size of DTS was -0.2928338, indicating a negative and statistically significant relationship between the size of DTS and firm efficiency. The negative coefficient suggests that a one-unit increase in the size of DTS results in a decrease in DTS efficiency by 0.2928338 units, holding other variables constant.

SASRA regulations exhibited a coefficient of 0.0103253 with a p-value of 0.000, signifying a positive and statistically significant relationship between adherence to SASRA regulations and firm efficiency. A positive coefficient implies that a one-unit increase in adherence to SASRA regulations by the DTS leads to a 0.0103253 unit increase in DTS efficiency, holding other variables constant. This indicates that SASRA regulations directly affect efficiency and may not serve as an effective moderating variable, as noted by Kimutai (2019).

Table 2: Interaction of SASRA regulation as moderator between firm characteristics and DTS efficiency
Source: Author (2024)

The P-value>0.05 shows no statistical relationship between capital structure and efficiency.

```
Random-effects tobit regression                 Number of obs      =      1157
Group variable: Sacc0_id                        Number of groups   =       176

Random effects u_i ~ Gaussian                   Obs per group: min =         1
                                                               avg =       6.6
                                                               max =         7

Integration method: mvaghermite                 Integration points =        12

                                                Wald chi2(8)       =    145.85
Log likelihood  =  3237.5216                    Prob > chi2        =    0.0000
```

Bias_Corrected_Eff	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Capital_Structure	.0150454	.0113188	1.33	0.184	-.007139	.0372299
Age_DTS	-.0003129	.0004928	-0.63	0.525	-.0012788	.000653
Techinvest	-.0149839	.0062512	-2.40	0.017	-.027236	-.0027317
Sizeof_DTS	-.3212879	.1284141	-2.50	0.012	-.5729749	-.069601
M_Cap	-.0000674	.0012535	-0.05	0.957	-.0025242	.0023894
M_Age	.0000881	.0000843	1.04	0.296	-.0000771	.0002533
M_Technoinvest	.0019926	.0010898	1.83	0.068	-.0001435	.0041286
M_Asset_DTS	.0043256	.0047532	0.91	0.363	-.0049904	.0136417
_cons	1.1859	.1087758	10.90	0.000	.9727037	1.399097
/sigma_u	.0196106	.0012017	16.32	0.000	.0172554	.0219659
/sigma_e	.0114573	.0002637	43.45	0.000	.0109405	.0119741
rho	.7455251	.025532			.6930327	.7928879

```
Observation summary:          0  left-censored observations
                           1150     uncensored observations
                              7 right-censored observations
```

Likewise, the p-value for the age of DTS is 0.525, suggesting no significant relationship with efficiency. On the other hand, technological investment shows a negative coefficient of -0.0149839 (p = 0.017), less than the statistically significant level at α=. This implies that SASRA regulation strengthens the relation between technical investment and efficiency, which is too weak to have a statistically significant meaning. DTS size shows the same pattern. The coefficient is negative (-0.3212839), and the p-value is less than 0.05 (p<α=0.\] indicates a significant relationship with efficiency when interacting with SASRA regulation.)

The link between SASRA regulations and capital structure has a Pvalue 0.957>0.05 indicating that the relationship does not have statistical significance. The relationship between SASRA regulation and the age of DTS is at a p-value of 0.296 indicating no statistical significant The interaction between SASRA regulation and technological investment has a p-value of 0.068, suggesting a statistically insignificant relationship in moderating the connection between technological investment and efficiency. Likewise, the interaction between SASRA regulation and the size of

DTS has a p-value of 0.353, indicating an insignificant relationship as a moderator in the relationship between the size of DTS and efficiency.

Notably, when the moderator variable is incorporated, the rho value decreases from 0.80936 to 0.74552, reflecting a drop in the proportion of total variance represented in efficiency (dependent variable) attributable to random effects from 80.936% to 74.552%. This suggests that major variations in the dependent variable result from across-group random effects, decreasing by 6.384% (80.936 - 74.552). None of the interacted variables are statistically significant at a 5% level, with p-values greater than 0.05. Consequently, the study concludes that SASRA regulation is not a good moderating variable between firm characteristics and firm efficiency in DTS.

Table 11 Marginal effect after Tobit Regression

```
. margins,dydx(Capital_Structure Age_DTS Techinvest Sizeof_DTS M_CapitalS M_AgeOfDTS M_Techniv M_SizeOfDts)

Average marginal effects                        Number of obs   =       1157
Model VCE    : OIM

Expression   : Linear prediction, predict()
dy/dx w.r.t. : Capital_Structure Age_DTS Techinvest Sizeof_DTS M_CapitalS M_AgeOfDTS M_Techniv M_SizeOfDts
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Capital_Structure	.0150455	.0113188	1.33	0.184	-.007139	.0372299
Age_DTS	-.0003129	.0004928	-0.63	0.525	-.0012788	.000653
Techinvest	-.0149838	.0062512	-2.40	0.017	-.027236	-.0027316
Sizeof_DTS	-.321288	.1284141	-2.50	0.012	-.572975	-.069601
M_CapitalS	-.0000674	.0012535	-0.05	0.957	-.0025242	.0023894
M_AgeOfDTS	.0000881	.0000843	1.04	0.296	-.0000771	.0002533
M_Techniv	.0019926	.0010898	1.83	0.068	-.0001435	.0041286
M_SizeOfDts	.0043257	.0047532	0.91	0.363	-.0049904	.0136417

Source: Author (2024)

Table 12 Computing of the Marginal Constant Intercept

```
. margins, dydx(_cons)

Predictive margins                              Number of obs   =       1157
Model VCE    : OIM

Expression   : Linear prediction, predict()
```

	Delta-method Margin	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_cons	.9254378	.0015111	612.41	0.000	.922476	.9283996

Source: Author (2024)

From the table 12 and table 13 output, the following model was formulated

Eff= 0.9254378 - 0.0149839Tec - 0.3212879S +…..ε_{it}

Where:

Eff= Efficiency, Tec=technological investment, S=size of DTS, ε_{it} = Error term at time t

The model indicate that when SASRA regulation is interacted with the firm characteristics, none of the variables is statistically significant confirming that SASRA is not a good moderator between

firm characteristics and efficiency in DTS.The study failed to reject the null hypothesis that SASRA regulations does not have a statistical significant moderating effect on relationship between firm characteristics and efficiency of DTS. In summary, SASRA regulation is not a good moderator between firm characteristics and efficiency in DTS.

Conclusions and Recommendations

Conclusion

The study findings indicate that SACCOs efficiency has an increasing growth trend within the study period but is not optimal with variable return to scale contributing the highest levels in efficiency relative to scale efficiency, Capital structure does not significantly affect level of efficiency while technological investment has a negative but significant relationship to influence efficiency levels. SACCOs have maintained low levels of earning assets in adherence to regulation. Technological investment has significant but negative effect on the relationship between investment on technology and efficiency. Additionally, the study established SASRA regulation does not significantly moderate relationship between firm characteristics and firm efficiency.

Recommendation

Based on the empirical findings of the research study, the following recommendations for practitioners and policy makers are suggested:

In pursuit of higher levels of efficiency in DTS, board of management to optimize loans issuance by having an increased member's deposits contribution which will enhance uptake of loans. To achieve optimization, the board of managements should strategize to educate members regularly on savings and innovatively develop new loan products for their members. Secondly, DTS ` board of management to focus and maintain an ideal capital structure that balances future risks of liquidation and current member's needs. Objectively, yearly retained earnings should be moderate and ensure payment of members rebates on interest from loan issued. Further, DTS` management boards should strategize and put in place rebate payment policy and adhere to the set regulations on external borrowing. This will ensure ideal capital structure mix which is not detrimental to core business of savings and credit. This will act as good sign of good performance in the SACCO which subsequently will improve member trust and goodwill in patronizing DTS products.DTS management should focus on strategies to secure longevity of DTS which targets to build a strong reputation in the market. This recommendation will be achieved by establishing a strong brand, providing high-quality services, and building strong relationships with members and other stakeholders. The board of directors and management team should enhance their trust with their members by ensuring close corroboration with the regulator and effective communications of emerging issues to its members promptly and frequently using the technology platform in place. The study findings recommend SASRA to reduce deposit levy by reviewing the ideal rate on deposits so as to enhance the Sacco sector` efficiency levels.

REFERENCES

Alsufy,F.; Afifa ,A.M., Soda. M.Z.(2020).Mediating effects of liquidity in therelationship between earning quality and market value of the share price: evidence from Jordan.*Economic research(Vol 19 Issue1/2020),pp.17-32 Url:http://www.reaser.er*.ISra University,Amman, Jordan, Al-Zaytoonah University of Jordan, Amman, Jordan.

Anania, P. & Rwekeza, G.C. (2018). Co-operative education and training as a means to improve performance in Co-operative Societies. *Sumerianz Journal of Social Science, 2018, Vol. 1, No. 2, pp. 39-50.https://www.sumerianz.com*

Benito, Sanchez, Hassan, M. Kabir, Bartkus & James., (March 20, 2013).Efficiency Determinants and Dynamic Efficiency Changes in Latin American Banking Industries. J*ournal of Centrum Cathedra: The Business and Economics Research Journal, Vol. 6, Issue 1, pp. 27-52, 2013*

Biwott (2016). Influence of capital Prudential requirement on technical efficiency of deposit taking SACCOs in Kenya

Biwott,M.,Macharia (2018).Financial regulation and firm's technical efficiency: does size matter? a case of deposit taking SACCOs in Kenya**,** *American Based Research Journal, Vol-7-Issue-10 Oct-2018 ISSN (2304-7151)* : https://ssrn.com/abstract=3580127

Danjuma,I.; Umar,M.S.,; Hammmawa,D.D., 2015: Mediating effect of cash management in relationship between capital structure and liquidity in small and medium enterprises. *International journal of economics and finance i*ssue,2015,5(4),9951000www.econjournals.com.Modibbo Adama University of technology,Yola,Adamawa State-Nigeria

Parker,D. & Kirkpatrick,C.(2012). Measuring Regulatory Performance. The economic impact of regulatory policy: a literature review of quantitative evidence, OECD, Expert paper No.3, August 2012

Fosu, E.A. (2017). Technical efficiency and total factor productivity of rural banks in Ghana. *Cogent Economics &Finance 5(1):1366088:* DOI: 10.1080/23322039.2017.1366088

Fred, C. O.B., James,K., & Mungai,F.N.,(2017):Effect of SASRA regulations on financial performance of Nyandarua county's deposit taking SACCOs in Kenya, *international journal of economics, commerce and management, United kingdom.*

Gatauwa, J.M. (2022) Privacy Equity Financing and Financial Performance, Acritical Review of Literature. . African Development Finance Journal http://journals.uonbi.ac.ke/index.php/adfj February Vol 1 No.2, 2022 PP 95-103 ISSN 2522-3186

Gianta.&Lina (2015) . Performance Valuation of credit unions having social and Self-sustaining aim

Gikuri & Paulo (2015) . SACCOs and members' expectations: factors affecting SACCOs capacity to meet members' expectations: a paper presented to the co-operative research workshop held on 24th march, 2015 at j.k. nyerere hall, Moshi co-operative university (mocu)

Ghazali.S. & Sabri.M. A. (2016). Efficiency of saving and credit cooperative units in north Aceh, Indonesia. DOI: 10.15408/sjie.v5i2.*3193 Journal of Signifikan Volume 5 (2), Page 99 - 118* .Majid University of Malikussaleh, University of Syiah Kuala

Jeremiah, M.K. & Bichanga, O.,(2014). Financial Factors Influencing Performance of Savings and Credit Cooperative. Organization in Kenya. *International Journal of Academic Research in Accounting, Finance and Management Sciences, vol. 4(2), pages 291-302,* DOI: 10.1111/j.1467-8292. 1996.tb01411.xS

Jerker,N.(2007). The nature of Cooperative values and principles. *Journal Annals of public and cooperatrive values and Principle Vol 67 pages 633-653.* DOI: 10.1111/j.146-8292.1996.tb01411.x

Kalundu,K..,Mirie,M.,Ochieng,D.E.&Lishenga,J.,(2019).Financial structure and operating efficiency of housing cooperative Societies.*European Scientific Journal vol.15, no. 1857-7431* DOI:10.19044/esj.2019.v15n28p109

Karan and Shanshank, S. T. & Shashank, P. (2013). Measuring bank performance of Nepali Banks: A data envelopment analysis (DEA) perspective, *Econjournals, vol. 3(1), pages 54-65*

Karan and Shanshanka,J.N.,October,(2013).The Relationship Between Size And Cost Efficiency of SACCOs With Front Office Service Activity In Kenya. http://erepository.uonbi.ac.ke:8080/xmlui/handle/123456789/58818

Kariuki (2016). Firm characteristics and financial intermediation efficiency of deposit taking saving and credit co-operative societies in Kenya, http://hdl.handle.net/123456789/2427

Ke, Tsz-Yi & Li, Yang & Chiu, Yung-ho. (2011). Analyzing for profit efficiency of banks with undesirable output. *Africa Journal Business Management. Vol 5*. DOI: 10.5897/AJBM11.176.

Keith, T. (2015). Learning from the Co-operative Institutional Model: How to Enhance Organizational Robustness of Third Sector Organizations with More Pluralistic Forms of Governance, *Journal of Administrative Sciences 2015,Vol5,148–164;* Doi:10.3390/admsci5030148www.mdpi.com/journal/admsci

Kimutai, C.J., (2019). Asset size quality and efficiency of deposit taking savings and credit cooperative societies in Kenya. *International Journal of Humanities and Social Science Vol. 9 No. 11 Doi*:10.30845/ijhss.v9n11p10

Kipesha, E.F. (2013). Impact of Size and Age on Firm Performance: Evidences from Microfinance Institutions in Tanzania. *Research Journal of Finance and Accounting4*,10516.https;//www.iiste.org/Journals/index.php/jRJFA/article/view/5091

Kithinji, A. M., Mwangi, M., Litondo, K., & Ogutu, M. (2017). Intervening Effect of Financial Services on the Relationship Between Bank Restructuring and Financial Performance. *European Scientific Journal, ESJ, 13*(28), 121. https://doi.org/10.19044/esj.2017.v13n28p121

Kothari C. R. (2012). Research Methodology Methods and Techniques, New Age International

Kuan-Chung, Y. & Chung-Yu, P., (2012). An Empirical Study of Credit Risk Efficiency of Banking Industry in Taiwan. *Web Journal of Chinese Management Review, Vol.15(1)*

Lotto,J.,(2019) Evaluation of Factors Influencing Bank Operating Efficiency in Tanzanian BankingSector,*CogentEconomics&Finance, 7:1*, DOI:10.1080/23322039.2019.1664192

Magali, J.J & Lang'at,. J.K. (2014). Impact of corporate governance on efficiency and Sustainability of the best rural SACCOs in Tanzania. Accounting School, Dongbei University of Finance and Economics:**G**lobal Journal of Commerce and Management Persepective.,Vol3 (2:1-8), APpril-MarCH 2014 ,ISSN: 2319 – 7285

Mutunga,M.M & Gatauwa, J.M (2021).Firm Characteristics and Financial Performance of Deposit taking Savings and Credit Co-operatives in Nairobi City County, Kenya. Kenyatta University, School of Business, Department of Accounting and Finance. International Research Journal Publishers, ISSN 2710-2742
www.irjp.org Vol 3, Issue 3, pp 772-787, Dec 1, 2021

Maja,P., Ivica,P and Marijana,C.,(2017). Influence of Age on Firm Performance: Evidence from the Croatian Food Industry. *Journal of Eastern Europe Research in Business and Economics* Vol. *2017 (2017) P9,* DOI: 10.5171/2017.618681

Manuela,G. B, (2019). Efficiency of credit unions in Brazil: an analysis of the evolution in financial intermediation and banking service. *RauspManagement journal. vol.55 (3),*Doi.org/10.1108/rausp-06-2018-0029

McGraw Hill, New York. Sustaining aim journal procedia. Social and behavioral sciences. Vol 213 issue 2015 page 56 Doi:10.10.1016/j.sbspro.2015.11.561

Mirie, M., (2014). The influence of members' income and conduct of SACCOs in the Relationship between characteristics and efficiency of SACCOs in Kenya.

Molk, P. (2014). The Puzzling Lack of Cooperatives, 88 Tul. L. Rev. 899 (2014): https://scholarship.law.ufl.edu/facultypub

Moses, B. (2016). Impact of Prudential Regulations on Technical Efficiency of Deposit Taking Cooperative Societies in Kenya

Mugenda, O. & Mugenda, A. (2003). *Research methods, quantitative and qualitative approaches*, Nairobi Acts Press

Mugo, D.M., Muathe,S. & Waithaka,T.S.,(2019): Performance Analysis of Debit Card Services on Deposit-Taking SACCOs' Financial Performance: A Case of Kenya, *The African Journal of Information Systems*: Vol. 11 :Iss. 2, https://digitalcommons.kennesaw.edu/ajis/vol11/iss2/3

Mungai,N.F (2017).Effect of SASRA Regulations on Financial Performance of Nyandarua County's Deposit Taking SACCOs in Kenya: *International Journal of Economics, Commerce and Management Vol. V, Issue 7, July 2017* : http://ijecm.co.uk/ ISSN 2348 0386

Mutinda,D.N.,(2018).Effect of prudential regulatory standards on the financial performance of deposit taking SACCOs in Kenya,

Njau, E.W. (2013). Determinants of efficiency of deposit taking savings and credit cooperative societies in Kenya, http://erepository.uonbi.ac.ke/handle/11295/107130

Njoroge, J.K.(2013).The relationship between size and cost efficiency of SACCOs with front office service activity in Kenya, http://erepository.uonbi.ac.ke:8080/xmlui/handle/123456789/58818

Nyankomo.M & Aziakpono, M. (2016). Technical and scale efficiency of Tanzanian saving and credit cooperatives. *The Journal of Developing Areas, 50*(1),29-46. http://www.jstor.org/stable/24737334

Ochola, P.(2016). A two stage study of efficiency of savings and credit cooperatives society in Kenya an application of data envelopment analysis and Tobit regression Modelling *International Journal of Economics, Commerce and Management United Kingdom Vol. IV, Issue 4, April 2016* ,http://ijecm.co.uk/ *of Emerging Research Management & Technology ISSN2278-9359 Vol5 –issue 6*

Onguka,E.M(2012).The effect of regulations on the financial performance of deposit taking savings and credit cooperative societies in Kenya. http://erepository.uonbi.ac.ke/handle/11295/95425

Onguka,E.M. (2012). Investigate the effect on management efficiency, liquidity and capital adequacy on the financial performance of deposit taking SACCOs

Paulo, A. (2015). SACCOs and members' expectations: factors affecting SACCOs capacity to meet members' expectations: A paper presented to the co-operative research workshop held on 24th march, 2015 at J.K. Nyerere hall, Moshi co- operative university (MoCU) https://www.researchgate.net/publication/308948542

Piot-lepetit, I., Perrigot, R., & Cliquet, G. (2012). Impact of the industry on franchise chain efficiency: A meta –DEA and context dependent DEA approach. *The Journal of the Operational Research Society*,65(11),1692-1699.Retrieved April 20,2021, from http://www,jstor.org/stable/24505081 publishers. Edition:2nd ed. Publishers. New Delhi New Age 1990

Rayees, F & Sandeep, V (2017). moderating variables in business research. The *IUP Journal of Business Strategy, XIV, 4, 2017*

Sangali (2013) comparative analysis of the financial performance of saving and credit cooperatives societies in Kisarawe-district

Saravia, A.J., Carlos, S.G., and Almoravid, P.A., (2019). Determinant of systematic risks with perspective of life cycle of a firm. https://www.reserschgate.net/publication/3278824763.Doi.10.1002.ijfe.1934.Int *JFin Econ.*2021:26:1037-1049

SASRA Supervisory report (2010). Government printers press. www.sasra.go.kehttps://www.sasra.go.ke

SASRA Supervisory report (2015). Government printers press. *www.sasra.go.kehttps://www.sasra.go.ke*

SASRA Supervisory report (2018).Governmentprinters press. *www.sasra.go.kehttps://www.sasra.go.ke*

Saunders, M., Lewis, P., &Thornhill, A.2012 Research methods for business studies edition.

Tahir,S.H.,et.al (2020) Bakar,A.M., Syed,N., (2020).Mediating role of liquidity policy on the corporate governance performance link: evidence from Pakistan. D*oi:10.131106/jafeb.2020.vol17.no8.015, http:// creativecommons.org/licences/by-nc/4.0/* University of Faisalabad, Pakistan.

Tsz-Yi (2011). Analyzing for profit efficiency of banks with undesirable Output

Ugwuanyi, W. & Ugwunyi, G.O. (2013). Evaluation of information technology (It) investments on bank returns: Evidence from Nigerian banks. A department of banking and finance, Enugu state University of science and Technology, Enugu state, Nigeria. *Research Journal of France and Accounting* WWW.iiste.orgISSN2222-1697(paper)ISSN2222-847(Online)Vol.4,No.4,2013 155

Wafula,N.W., 2020 : Firm characteristics and financial stability of commercial banks in Kenya.

Yi,K.T.,Yang,L., & Ho,C.Y.(202).Analyzing for profit efficiency of banks with undesirable output. *African Journal of Business Management*,5(20),8141-8149.Doi:10.5897/ajbm11.176

Zhang, Guanghong; Lee, Yune (2021): Determinants of financial performance in China`s intelligent manufacturing industry: Innovation and liquidity, *International Journal of FinancialStudies*,ISSN2227-7072.MDPI,Basel,9Iss,1.1-19,https://doi.org/10.3390/iijfs9010015