Influence of Loan Advance Ratio on the Loan Performance of Deposit Taking SACCOs in Kenya

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Abstract

The financial viability and long-term sustainability of SACCOs is threatened by credit risk that poses a challenge despite growth in the sector. We explore the influence of capital adequacy on loan performance of deposit taking SACCOs in Kenya. Time series cross sectional unbalanced secondary panel data was analyzed from 175 deposit taking SACCOs licensed by SASRA as at December 2017. The data was obtained from audited financial statements submitted to SASRA over a five-year period (2013-2017). The unbalanced panel data was analyzed quantitatively using regression equations. The study adopted capital adequacy as the explanatory variable for the study and we applied both the long run (static) and short run (dynamic) panel models. The long run models assumed that previous period's performance did not affect present period's performance and therefore, no persistence (no lag dependent explanatory variables) in the model. The short run models assumed that immediate previous period performance will lag dependent explanatory variable, thus influenced present period's performance. The Mann-Whitney U test was utilized in testing for robustness to see if the results of the empirical model would hold when subjected to a non-parametric test. Before the administration of multiple regression analysis a number of essential assumptions were checked so as to avoid type I and type II errors that occur during the interpretation stages of the model. These assumptions included testing for heteroscedasticity, autocorrelation, multivariate normality, multi-collinearity and linearity. Results show that loan and advance ratio significantly influence performance of loans in deposit taking SACCOs in Kenya.

Keywords: Credit risk, loan advance ratio, total loans and advances, total deposits

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INTRODUCTION

The main activity of deposit taking Saccos is using the funds (deposits) from the members effectively by way of lending (financing). In general the loan-deposit ratio measures the financial institution's liquidity as well as the profitability. The ratio is calculated by dividing the total amount of loans, by total amount of deposits (Michael, 2014). Loans remain the key assets for Deposit Taking Saccos comprising 73.42% of the total asset base. This calls for consideration of the quality of the loan portfolio of Deposit Taking Saccos, with adequate safeguards to provide for any non-performing portfolios. The total loan portfolio at risk, measured as a ratio of the non-performing loans to gross loans increased to 5.23% from 5.12% registered in 2016. The total loans are shown in the balance sheet in the name of 'loans, advances and financing', it includes term loans, credit card receivables, bills receivables, trust receipts, claims on customers under acceptance credits, loans/

financing to financial institutions, resolving credits and staff loans. Total deposits include both deposits from customers and deposits and placements from banks and other financial institutions. Deposits from customers includes demand deposits, savings deposits, fixed deposits, special investment deposits, money market deposits, negotiable instruments of deposits and structured deposits. According to the SASRA Annual Reports 2017, the loans and advances constituted a huge portion of the total assets which stood at Kshs 288.92 billion in 2017 up from Kshs 251.08 billion in 2016. This represented a 15.1% year to year growth rate. Therefore, the study considered the loans and deposits of the 175 deposit taking Saccos for the period of five years and calculated the ratios where the study considered amount of loans and deposits from the audited financial statement in the SASRA annual reports.

Kibor, Ngahu and Kwasira (2015) carried out a study on influence of credit risk management on loan performance in commercial banks in Nakuru town, Kenya. It was concluded that effective lending polices played a significant role in credit risk management amongst commercial banks in Nakuru town. It was also inferred that lending policies have significant influence on the performance of bank loans. They concluded that putting a ceiling on the loans advanced to bank customers could enhance credit risk management. They further concluded that determination of borrowers' credit worthiness is crucial in credit risk management. Lastly, credit standards were found to strongly affect loan performance of commercial banks. Muriithi, Waweru and Muturi (2016) carried out a research on the effect of credit risk on financial performance of commercial banks in Kenya. From the results credit risk had a negative and significant relationship with bank profitability. Poor asset quality or high non-performing loans to total asset is related to poor bank performance both in short run and long run.

Mbucho (2015) undertook a study on the influence of credit management on the loan performance among microfinance institutions in Kenya. The research concludes that risk management affects the loan performance to a great extent. It was evident from the research that most MFIs have recognized the need for proper risk management and taken up the necessary measures to promote it. The findings also concluded that the interest rate charged on the loans affects the loan performance on the highest scale among the variables which were used in this study. Among the reasons why it was the highest was because, interest rate affects the repayment ability of the customers, affects the sale of the loan and also may contribute to a high rate of nonperforming loans.

Hassan & El-Ansary (2015) carried out a study on the influence capital adequacy ratio (CAR) in the Egyptian Commercial Banks. Profitability showed no impact on the capital adequacy ratio. Liquidity represented only in loans to deposits is significantly correlated positively to the capital adequacy ratio. Asset quality is significantly correlated positively to the capital adequacy ratio. Size of the bank is significantly correlated negatively to the capital adequacy ratio. Risk represented only in loans loss reserves ratio is significantly correlated with the capital adequacy ratio. Management Quality represented in total loans to total assets is significantly correlated positively to the capital adequacy ratio. In conclusion, Loans Loss Reserves to total loans is significantly correlated negatively to the capital adequacy ratio. Also, earning assets to total assets appears to have an impact with the capital adequacy ratio. So after financial crisis Egyptian banks are more concerned to the loans quality, credit risk. From survey of relevant literature, it was found that there are few studies specific to Kenya on the link between loan advance ratio and loan performance of deposit taking Saccos. This study therefore intended to fill these pertinent gaps in literature by studying the influence of loan advance ratio on loan performance of deposit taking Saccos' in Kenya.

METHODOLOGY

A descriptive research design was adopted, and Time Series Cross Sectional (TSCS) data was used to show the influence of capital adequacy on the loan performance of deposit taking Saccos in Kenya. A panel design was thus considered which a combination of time series cross sectional observations was and due to this it was considered one of the most effective designs in the study of causation, other than pure random experiment (Stimson, 1985).

Population and Sampling: The target population of study was all the deposit taking Saccos in Kenya regulated by SASRA. As at 31st December, 2017, there were 175 deposit taking Sacco societies licensed to undertake deposit-taking Sacco business in Kenya for the financial year ending December 2017 (SACCO supervision Report, 2017). A census was carried out targeting all the 175-deposit taking SACCOs regulated by SASRA as at 2017. A census technique considers inclusion of all the elements in the sampling frame into the study which eliminates sampling bias. A census was considered in cases where taking smaller samples of the population would not be cost effective. The study used secondary data collected from SASRA for all the SACCOs being studied thus a census was considered adequate and adopted without any additional costs.

The Secondary data was extracted from audited financial statement submitted to SASRA by the deposit taking SACCOs after being registered by Commissioner for Co-operative Development. The data covered a 5-year period from 2013 -2017. The Panel data was collected because it helped study the behavior of each deposit taking Sacco over time and across space (Baltagi, 2005 & Gujarati, 2003). Polit and Beck (2010) also indicated that secondary analysis of existing data is efficient and economical because data collection is typically the most time-consuming and expensive part of a research.

Measurement of Variables: Loan and advance ratio (LAR) is a ratio between the Sacco's total loans and advances to total deposits. If the ratio is lower than one, the Co-operative Society will rely on its own deposits to make loans to its customers, without any outside borrowing. If, on the other hand, the ratio is greater than one, the Saccos will borrow money which it relined at higher rates, rather than relying entirely on its own deposits. Saccos may not be earning an optimal return if the ratio is too low. If the ratio is too high, the Saccos might not have enough liquidity to cover any unforeseen funding requirements or economic crises. The deposit taking Saccos will employ loan and advances to deposit ratio. This ratio indicates the ability of Saccos to withstand deposit withdrawals and willingness of Saccos to meet loan demand by reducing their cash assets. When the Saccos are more liquid, they can reduce risk of insolvency.

$$Loan\ Advance\ Ratio = \frac{Total\ loan\ and\ advances}{Total\ Deposits}$$

Loan performance was measured using non-performing loans (NPLs). The efficiency of the loans in the deposit taking Saccos was evaluated by applying NPLs, since it shows that Saccos reinvest its earnings to generate future profit. The growth of NPLs also depended on the capitalization of the deposit taking Saccos and the Saccos' operating profit margin.

$$Loan\ Performance = \frac{Total\ NPLs}{Gross\ Loans}$$

The data structures (panel data) are multilevel with 2 levels of analysis (entity and time). Panel data model specification in this study was based on the existence of heterogeneity and whether existing heterogeneity is correlated to model predictors. Model specification tests will be carried out to determine the level of heterogeneity and to inform the appropriate model. A pooled model also referred to as the population averaged model assumes that that latent heterogeneity has been averaged out as

individual effects are not persistent across entities and thus panel effects do not exist.

Model Specification: Objective two was to establish whether Loan Advance Ratio influences the loan performance of the deposit taking Saccos in Kenya. Non-performing Loans was considered as a measure for loan performance and therefore, was used as the dependent variable whereas loan advance ratio was considered as the independent variable. The study assumed that the independent variable and the dependent variable have a general multiplicative Cobb Douglas functional relationship shown in the equation below:

$$L.P = f\ (LAR)$$

Upon linearization and parametization the possible models were specified as:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \varepsilon_{it} .. \text{Fixed effect model}$$

or

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \mu_{it} + \varepsilon_{it} \ \ldots \text{Random effect model}$$

In which Y_{it} represented the loan performance of Sacco i at time t, β_0 stands for the model constant or intercept, β_1 stands for the coefficient of the predictor Loan Advance Ratio. X_{it} stands for Loan Advance Ratio of Sacco i at time t. μ_{it} is the Sacco (entity) specific effect that is assumed to be normally distributed with a constant variance with a constant variance and ε_{it} is the idiosyncratic error term which is assumed to have a normal distribution.

The classical assumptions of linear regression models were tested including the assumptions of homoscedasticity, non-autocorrelation, normality and cross-sectional independence (Cohen *et al*., 2013; Mason & Perreault Jr, 1991). In case of violation of the homoscedasticity, non-serial correlation and / or cross-sectional independence assumptions, a generalized least squares model was considered to incorporate the autocorrelation coefficient and allows for robust heteroscedastic residuals with cross-sectional dependence. In case of violation of the normality assumption on the other hand, a bootstrap was carried out as a resampling technique to cater for the violation.

RESULTS

Loan and advance ratio (LAR) is a ratio between the Sacco's total loans and advances to total deposits. Data was collected on total loans and total deposits which were used as the 2 components of loan adequacy ratio. The summary descriptive statistics of the 2 components were generated by year and results presented in Table 1. Both the total loans and total deposits for the entities were noted to increase over time. The mean total loans issued in the industry in year 2013 were 1.44 billion which was seen to be on an increasing trend over the years to 5.02 billion in the year 2017. The total deposits also increased from 1.28 billion in 2013 to 2.85 billion in 2017. The standard deviations of both found to reduce over the years which is an indication that the industry also tended to be more heterogeneous in the earlier years in terms of both loans issued and deposits.

Table 1: Total loans and Total deposits

	Total Loans (in millions)		Total Deposits (in millions)	
Obs	Mean	Std. Dev.	Mean	Std. Dev.
135	1,440	2,810	1,280	2,390
135	2,420	4,810	1,520	2,540
135	3,050	5,860	1,830	2,590
135	4,760	2,190	2,790	1,340
135	5,020	2,080	2,850	1,250

The measure of loan advance ratio was calculated by dividing the total loans issued by the total assets. As shown in Table 2, the overall loan advance ratio was found to be 1.563. The average loan advance ratio is greater than one implying that on average, the SACCOs tend to give loans in total amount to more than the deposits collected. The standard deviation of the loan advance ratio

was found to be 1.059. This variation when decomposed to the components of the panel data levels was found to depict higher variation within groups (over time within the entities) than between groups (cross-sectional).

Table 2: Loan advance ratio summary statistics

	Mean	Std. Dev.	Min	Max	Observations		
overall	1.563134	1.059134	0.1626438	14.86052	N	=	675
between		0.6518611	0.8274203	6.189953	n	=	135
within		0.8362796	-3.151884	10.2337	T	=	5

Loan performance was the dependent variable of the study that was also computed for each entity from the total non-performing loans and the total loans. The annual average non-performing loans for the industry were noted to also have an increasing trend over time with the total loans and all the indicators assessed earlier (Table 3). The overall mean non-performing loans in 2013 were Ksh. 65 million which increased annually to Ksh. 128 million in 2017. The variation was however found to decrease with time which was the trend also found in the variation of the independent variables which implies that the industry was more heterogeneous in earlier years where the entities tended to have different ways of operations that yielded varying results. With time however, the industry seemed to streamline to more homogeneous operations of the SACCOs yielding similarity in results with low standard deviations.

Table 3: Total Non-Performing loans

Yr	Obs	Mean	Std. Dev.
2013	135	65,100,000	125,000,000
2014	135	74,600,000	102,000,000
2015	135	69,200,000	99,100,000
2016	135	129,000,000	61,500,000
2017	135	128,000,000	56,100,000

The measure of loan performance was taken as a ratio of non-performing loans to total loans. The efficiency of the loans in the deposit taking SACCOs was evaluated by applying NPLs, since it shows that SACCOs reinvest its earnings to generate future profit. The ratio was calculated by dividing the NPLs by the total loans. This ratio of performance calculated considering the NPLs as a numerator however tend to have pessimistic (reverse) implication of performance. The higher this ratio is implies that the firm is faced with a challenge of more non-performing loans in relation to the total loans with is an implication of poor performance. If low, the ratio indicates that the firm has fewer non-performing loans in relation to the total loans thus an implication of goo performance. The summary statistics for loan performance was calculated and presented in Table 4. The overall mean loan performance ratio was found to be 0.127 across all observations with a standard deviation of 0.659. It was also noted that the standard deviation of loan performance within groups was larger than that between groups. This shows that the industry is less heterogeneous across the entities compared to the changes over time.

Table 4: Loan performance ratio summary statistics

	Mean	Std. Dev.	Min	Max	Observations		
overall	0.127	0.659	0.000	14.928	N	=	675
between		0.352	0.005	3.535	n	=	135
within		0.557	-3.380	11.520	T	=	5

Regression models were fitted to test hypotheses and draw conclusions on the study objectives by testing the hypotheses from the data collected. The collected data reflected both time series and cross-sectional variations, the models fitted were based on panel data model specifications as presented in this section. Panel data such the dataset used in this study has a structure with groups of time series data in each of the entities. The data was found to exhibit a strong balanced panel characteristic as all entities had equal number of 5 time periods (years).

For model specification, panel stationarity tests were carried out on the variables followed by other model specification tests. The Hadri Lagrange multiplier (Hadri LM) stationarity test to was used to assess the stationarity of the dataset which investigated the null hypothesis that all panels exhibit stationarity which is rejected if the P-value of the Hadri LM statistic is less than 0.05. The p-values of the statistic of both variables were greater than 0.05 thus the study failed to reject the hypothesis of panel stationarity and concluded that the panel dataset exhibited panel stationarity.

This study aimed at assessing the influence of loan advance ratio on the loan performance of deposits taking SACCOs in Kenya which informed the bivariate regression model fitted. Both the model specification LM-BP test for the pooled model and Haussman test for fixed effect model and the random effect model were carried out which flavored the random effect model to the fixed effect or pooled model. The results of the Haussmann test chi-square statistic was found to have a p-value of 0.0638 which is greater than 0.05 favoring the random effect model to the random effect model for this one predictor model.

The random effect model results for the bivariate model on the influence of Loan advance ratio on loan performance are as shown in Table 7. The R-square statistics show that from the variance component within the SACCOs, up to 3.7% of the variation in loan performance is explained by Loan advance ratio. The variation explained by loan advance ratio due to cross entity differences explains only 0.1% of the variance in loan performance. The Wald chi-square statistic had a p-value of 0.000 which was less than 0.05 implying a general significance of the random effect model. The Coefficient of Loan advance ratio on the model was also found to be a significant estimate of 0.091 with a p-value of 0.044 which is less than 0.05.

Table 5: Unit root test for Panel stationarity

Hadri LM test for stationarity		
Ho: All panels are stationary	Number of panels = 135	
Ha: Some panels contain unit roots	Avg. number of periods = 5	
	Statistic	**p-value**
Loan_advance_ratio	1.1774	0.1193
Loan_Performance	1.263	0.1033

Table 6: Bivariate model Haussmann specification; Loan advance ratio as predictor

	(b) fixed	**(B) random**	**(b-B) Difference**	**sqrt(diag(V_b-V_B)) S.E.**
Loan advance ratio	0.118	0.091	0.026	0.015

Chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 3.32, Prob>chi2 = 0.0683

Table 7: Bivariate Model; Loan Advance Ratio as predictor

Random-effects					Group variable: entity code	
within	**R-square between**	**Overall**	**F(1,539)**	**Prob > F**	**corr(u_i, Xb)**	
0.031	0.001	0.017	14.17	0.000	-0.2445	
Loan performance	**Coef.**	**Std. Err.**	**T**	**P>t**	**[95% CI]**	
loan_advance_ratio	0.091	0.024	3.760	0.000	0.044	0.139
_cons	-0.016	0.049	-0.320	0.747	-0.111	0.080
sigma_u	0.223					
sigma_e	0.613					
Rho	0.116	(fraction of variance due to u_i)				

The general implication of the results of this bivariate fixed effect model was that Loan advance ratio has a significant direct effect on loan performance across entities. The equation generated from the model is given below:

$$\hat{Y}_{it} = 0.091X_{it}$$

The influence was positive to imply that increasing Loan advance ratio by a unit would lead to an increase in the loan performance ratio by 0.091. Increasing the loan advance ratio by either increasing the total loans or reducing the deposits taken would result in an increase in the ratio of non-performance of loans to the total loans issued. The findings were consistent with a study carried out by Gweyi, Olweny and Oloo (2018).

The random effect model was tested and diagnosed for the model assumptions of normality, homoscedasticity, non-serial correlation and cross-sectional independence. The assumption of non-serial correlation tested using the Breusch-Godfrey/Wooldridge test was found not to have been violated. A Lagrange Multiplier test was used for panel homoscedasticity, the Pesaran Friedman test for cross-sectional independence and the Jarque Bera (JB) test for normality of both levels of the residuals (e_i and u_i). Apart from the non-serial correlation assumption, all the other model assumptions were violated.

Due to the violation of some of the assumptions, the fixed effect model fitted was not deemed adequate for testing study hypotheses. A generalized least squares (GLS) model was fitted which allowed for robust heteroscedastic residuals and cross-sectional dependence. On fitting the GLS model, bootstrapping was also carried out due to the violation of the normality assumption. The assumption surrounding serial correlation was not violated thus no autocorrelation lags were fitted and both predictors were retained without omission as they did not exhibit multicollinearity.

Table 8: Summary of Regression Assumptions Diagnostic Tests

Test	**Assumption/ Purpose**	**Test statistic**	**P-value**	**Conclusion**
Breusch-Godfrey/Wooldridge	Non-Serial correlation	F (1, 134)= 0.258	0.6121	Assumption not violated
Wald Test	Panel Homoscedasticity	Chi2(2660118) = 4.11e+08	0.000	Assumption violated
Bera-Jarque (JB)	Normality on e	chi2(2) = 13.31	0.0013	Assumption violated
Bera-Jarque (JB)	Normality on u	chi2(2) = 1.12	0.5707	Assumption not violated
Pesaran Friedman test	Cross-sectional independence	Pesaran's Z = 31.730	0.000	Assumption violated

The model was found to be generally significant as shown by the Wald Chi-square statistic of 9.79 with a p-value of 0.0018. Unlike OLS models, GLS model are based on maximum likelihood. The R-squared statistic generated from the GLS sums of squares is not necessarily bounded between zero and one and thus may not truly reflect the percentage of the total variation in the dependent variable that is accounted for by the model. The analysis however included computation of Pseudo R-squares and Pseudo adjusted R-squares using on McFadden's Pseudo R-square formula which is based on the log likelihood statistics. McFadden's Pseudo R-square was adopted as the log likelihood statistics used in the formula also form the basis of parameter estimation in maximum likelihood techniques adopted in GLS models. Unlike other Pseudo R-squares, McFadden's technique also includes possibility of calculating the Adjusted R-square that takes into account the number of predictors in the model. The predictors (Loan advance ratio) was found to be significant at level 5% as shown by the Z-statistics that had a p-value less than 0.05. The constant term for this model was also found to be significant as shown by the p-value of 0.000 which was less than 0.05. The resulting model was thus given by the equation below:

$$\hat{Y}_{it} = 0.029 + 0.080X_{it}$$

Table 9: Regression Results for Loan Advance Ratio on Loan Performance

Coefficients: generalized least squares				
Panels: heteroscedastic with cross-sectional correlation				
Correlation: no autocorrelation				
Pseudo R-square	**Adjusted R-square**	**Log likelihood**	Wald chi2(1)	Prob > chi2
.0476	.0492	565.270	9.79	0.0018
	Coefficients	**Bootstrap Std. Err.**	**Z**	**P>/z/**
Loan advance ratio	0.019	0.006	3.130	0.002
_cons	0.023	0.009	2.460	0.014

The results for this model was used to test the hypothesis and draw conclusions on the objective which was to determine the influence of Loan advance ratio on the loan performance of deposits taking SACCOs in Kenya.

> **H_{01}:** Loan advance ratio has no significant influence on the loan performance of deposit taking SACCOs in Kenya.

From the joint effect GLS model, the coefficient estimate of Loan advance ratio was found to have a p-value of 0.001 which was less than 0.05. The null hypothesis was thus rejected and a conclusion drawn that Loan advance ratio had a significant influence on the loan performance of deposits taking SACCOs in Kenya.

DISCUSSION

The results generally show a tendency of growth in the industry which also tended to be more homogeneous with time implying that all the entities reported varying levels of growth. The mean total loans issued in the industry in year 2013 were 1.44 billion which was seen to be on an increasing trend over the years to 5.02 billion in the year 2017. The overall mean non-performing loans in 2013 amounted to 65 million Kenya shillings which increased annually to 128 million Kenya shilling in 2017. Kisala (2014) carried out a research on the effect of credit risk management practices on loan performance in microfinance institutions in Kenya. The study found that there was strong relationship between loan performance of microfinance institutions with credit risk management, the study further revealed that there was greater variation on loan performance of microfinance as results of change in GDP growth rate, the study further revealed that there was a negative relationship between

loan performance of MFIs, interest spread and interest rate charged on loans.

Loan advance ratio which was also an independent variable in this study was measured as a ratio of the observed total loans and advances to the total deposits of the SACCOs. The mean Loan advance ratio was 1.563 with a standard deviation of 1.059. The average being greater than one implying that on average, the DT SACCOs tend to give loans and advances that exceed the deposits collected. The variation in the loan advance ratio when decomposed to the components of the panel data levels was found to depict higher variation within groups (over time within the entities) than between groups (cross-sectional).

The study also found the loan advance ratio was also found to have a significant relationship with the performance of loans (β= 0.091, p-value = 0.000). The results show that increasing the ratio of loan advancement to the total deposits was associated with a positive effect on the ratio of loan non-performance to the total loans. The trends in both deposits and total loans issued were seen to be increasing over time with fewer differences between the firms. This shows that the industry was still bound to experience growth in both deposits and total loans, however, the growth in total loans had been observed to grow faster over the years compared to the growth in deposits resulting to an increase in loan advance ratio. In relation to the performance of loans, this ratio was seen to increase the ratio of non-performance of loans. It is thus expected that should the trend of higher increase in loans than deposits persist, the DT SACCOs will experience increased poor performance in loans issued. The findings were consistent with a study carried out by Gweyi, Olweny, & Oloko (2018) on the influence of financial risk on the financial performance of Deposit Taking Saccos in Kenya. The study gave recommendations which included setting up a clear credit policy that will not negatively affect profitability and also they would need to know how credit policy affect the operation of their Deposit Taking Saccos to ensure judicious utilization of deposits and maximization of profit. Deposit Taking Saccos should manage liquidity risk by reinforcing its own resources since depositors could at any time and under unexpected reasons withdraw their deposits from the Sacco to seek investment elsewhere with higher returns. Deposit Taking Saccos in Kenya should also ensure that they adopt and implement a sound operational risk management practices.

CONCLUSION

The loan and advance ratio significantly influence the performance of loans in deposit taking SACCOs in Kenya. From the study findings, the null hypothesis linked to this objective was rejected and a conclusion drawn that LAR significantly influences the performance of loans in the deposits taking Saccos' in Kenya. The direct effect of loan advance ratio showed a positive effect on the ratio of non-performance of loans to total loans. This shows that by increasing LAR would result into an increase in this ratio of non-performance which was an implication of reduced performance of the loans. Issuing more loans and advances in excess of the Deposit Taking SACCOs total deposits would result into reduced performance of loans.

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