Financial Regulation and Firm's Technical Efficiency: Does Size Matter? A Case of Deposit Taking SACCOs in Kenya

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Abstract:

The unprecedented growth of SACCOs in Kenya and its influence on the mainstream financial systems has made the sector a key target for financial regulation. The unique operating principles of SACCOs that limits the adoption of conventional CAMEL-based banking regulatory framework has led to the formulation of SACCOs Societies Act 2008. The implementation of the act started in 2010, and by 2014, all Deposit-taking SACCOs, irrespective of their size were expected to have achieved full compliance. Four years later, a number of SACCOs remain non-compliant with concerns raising over the true influence of the regulations on the performance of the targeted SACCOs. This paper looks at the influence of size as measured by the total assets on the relationship between compliance levels and Technical Efficiency of the SACCOs. A two-stage fixed-effect model was used. Data Envelopment Analysis (DEA) was used to estimate individual SACCO technical efficiency while a moderated fixed effect panel model was used to estimate the influence of size on the relationship between the levels of compliance and technical efficiency. Meeting capital adequacy and investment ratios set out for the SACCO was found to negatively influence the resulting technical efficiency of Deposit Taking SACCOs in Kenya. However, size does not significantly moderate between the levels of compliance and technical efficiency.

Keywords: *Technical Efficiency, Financial Regulation*

I. Introduction

In the last two decades alone, the Savings and Corporative Societies (SACCO) movement in Sub-Sahara Africa has seen unprecedented growth in popularity, membership, asset holding and outreach providing financial services to close to 10% the sub continent's population. SACCOs today represent one of the most important sources of national economic growth and household empowerment in developing countries holding the potential of lifting millions out of abject poverty. First introduced by Father John McNulty in Ghana in 1959 with the intention of assisting rural villagers to improve their economic status, with English speaking nations more receptive to the concept, Ghana, Uganda, Nigeria, Tanzania, and Kenya has become the frontiers of SACCO in the continent [1]

The history of cooperative society's growth and regulation in Africa has been in two phases: A post-colonial era that began in the 1950's coming to an end in the mid-1990s when most African countries gained independence. This was an era characterized by stringent and cautious government control policies and programs integrated with national development frameworks. Cooperatives were highly supported and controlled by governments, often in return of political support that created unpredictability and patronage to the state and political kingpins[2]. The second era came in on the backdrop of global economic reforms that began in mid-1990's to the present. This is a period characterized by liberalization of economies, opening up of markets and a push for minimal government controls. It is during this era that SACCOs have seen a tremendous transformation into business ventures and an exponential growth experience across the continent[3]

The Kenyan Cooperative sector is rated the best in resource mobilization in Africa and 11th in the world[4]. The Saccos sub-sector continues to play a significant role in the financial sector with total assets amounting to Kshs 301.5 Billion and total deposits of Kshs 205.9 Billion with a sign of a non- relenting growth momentum (SASRA, 2014). The sector is structured on a two-tier system: The traditional Savings and Credit Cooperative Societies, currently categorized as Non-Deposit Taking Saccos, only licensed to provide a limited range of savings and credit products to its shareholding members only, and are supervised under the Cooperative

Services Act, Cap 490. The second tier consists of Deposit Taking Saccos (DTS) who, besides the basic savings and credit products, also provide basic 'banking' services such as demand deposits, payment services and channels such as quasi-banking services commonly known as ATMs and Front Office Service Activity (FOSA). This group is licensed and supervised under the Sacco Societies Act of, 2008[5].

By December 2013 there were over 6,000 registered Saccos in Kenya, 1,995 of which were active and only 215 were DTS. One hundred and thirty-five (135) were already licensed by SASRA while the remaining 80 Saccos were still in the process of satisfying the licensing requirements. The contribution of the DTS to the Sacco sector stood at 78% of the total assets and deposits of the entire Sacco sub-sector and commanded 82% of membership in the entire Sacco sector by the end of 2013 significantly raising government's interest in the sub-sector[6]. The DTS continues to be the key driver of the cooperative sub-sector with a consistent Compounded Annual Growth Rates (CAGR) growth rates of 11.30% in assets, 10% in deposits, 11.52% in loans and 16.96% in equity capital, rates that are above the conventional banking sector between 2011 and 2014[5]. The SACCO subsector is diverse in both ownership and market. Close to 40% of the licensed as at the end of 2011 was holding assets in excess of 1 billion shilling drawing its membership across the country, while a significant proportion is holding less than 1 billion shillings in assets with limited geographical outreach[6].

The original legal framework for regulating Saccos' in Kenya was provided by the Co-operative Societies Act of 1966 that gave government powers to be involved in the day to day management of co-operatives. The act was amended in 1997 removing much of the control of the government initially vested on Commissioner of Cooperatives under the Co-operative Societies Act 1966. With the push for linearization of the financial sector in the 1990s, a new act was necessary leading to the enactment of the current SACCOs act 2008. The new act was intended to provide a policy framework for cooperative development in Kenya by delineating cooperatives from the control of the government which was to assume a supervisory role[8]. Core to the act was the need to make co-operative societies autonomous, self-reliant, self-controlled and commercially viable institutions. Consequently, the initial role of the government was redefined from being a control orientation to one that sought to regulate and facilitate their autonomy. The results of freeing up SACCOs from government control saw unprecedented growth in the sector leading to a substantial influence on the mainstream financial systems and the fundamental economic indicators such as interest rate and inflation levels[9].

The rapid growth and influence of the sub-sector on the financial and monetary systems from early to mid-2000, called for a new way for monitoring and controlling their operations. The sector's unique operating principles could not be effectively covered by the mainstream commercial banking regulatory framework and hence the drafting of a SACCO Specific legislation leading to the enactment of the SACCO Societies Act 2008. The Sacco Societies Regulatory Authority (SASRA), a creation of the Act was constituted and inaugurated in 2009 with the prime responsibility of licensing, supervising and regulating all deposit-taking Sacco Societies in Kenya[9]. The reform process in the sector was centered on two objectives; protecting the interests of Sacco members and building confidence among the public towards the sector as a means of spurring countries' economic growth through the mobilization of domestic savings[9].

With the enactment of the act, all operating DTSs were required to review and align their policies and systems in line with the new regulatory standards demanding prudence in the management of business risks attendant to them namely credit, operational, market and legal[4]. With its implementation, radical changes on the core operational and financial elements relating to capital, investments, assets, and liquidity were to be realigned in conformity with the new standards and operational benchmarks set by SASRA[12]. As a result, DTSs irrespective of their size and financial status was forced to carry out drastic changes in liquidity management strategies, realign their capital structure, reorganize their asset portfolio, restructure their debt/loan management and upgrade their operating system.

The enactment of SACCO regulation Act 2008 and the subsequent establishment of Sacco Society Regulatory authority (SASRA) saw the introduction of prudential regulation for all Deposits-Taking Sacco's (DTS) irrespective of their size. All DTS by the coming of the new act into force were required to review and align their policies and operating systems to the regulatory requirements as a way of enhancing the prudent management of credit, operational, market and legal risks before they could be licensed to operate[4]. Between

2013 and 2016, the subsector average core capital to total assets ratio has increased from 7.74% to 12.17%, surpassing the recommended minimum of 8%, Return on Assets (ROA) continues to stagnate between 1.89% and 2.56%, Liquidity Ratio increased from 7.76% to a substantial 49.5% way above the recommended 15%, while, the ratio of Liquid assets to total deposits dropping from 36.4% to 18.05% less than the required 25%[18]. All these points towards the unfavorable trend in performance putting the Multibillion shilling sector at risk. A recent study by Ochola[13] reveals an even worsening efficiency level with only 24% DTS in Kenya attaining over 80% technical efficiency in 2013 down from 46% in 2011. The average technical efficiency was declining from an average of 81% in 2011 to 51% in 2013. While this result represents the performance of the entire subsector, individual DTS continues to experience varied levels of compliance and deviations with the smaller DTS being the hardest hit.

The implementation period of the act lapsed in June 2014, close to four years later, the effects of compliance to the stringent regulatory requirements on their inherent efficiency and whether the size of individual entities have had a moderating influence still remains un-assessed. Many questions still abound on whether the intention of the prudential regulations to improve efficiency has been achieved. Existing scholarly works have consistently focused on the banking sector, and where SACCOs are examined, they are limited to establishing the institutions' levels of efficiency with little or no effort to explain the underlying determinants[14]. The absence of insight into the effects of the current DTS regulatory requirements on the performance of such a key sector in the economy will mean a continued operation of the DTSs in a regulatory framework whose effects remains uncertain and in a performance trajectory whose end results and outcomes are not known. As a result of the foregoing, the study sought to assess whether the resulting allocative decisions of DTS managers in the context of regulatory compliance have been influenced by their size based on total assets.

II. Material And Methods

This survey study sought to examine the influence of Deposit Taking SACCOs size as indicated by their total assets as a moderator between prudential regulatory compliance and technical efficiency associated with managerial allocation decisions. A total of 215 SACCOs licensed to offer deposit-taking services in Kenya and were in operation at the beginning of 2008 a time when SACCO regulations were introduced and remained in operation up to 2016 were targeted.

A. Study Design: The study adopted a descriptive research design. Descriptive research seeks to obtain information concerning the current status of the phenomena and describe "what exists" with respect to variables or conditions in a situation[15]. It also explores in a systematic and accurate the characteristics or behavior of a given population[16]. The choice of descriptive research design was based on the need to bring to the fore the whether and to what extent size moderates between compliance with prudential requirements set out by SASRA and technical efficiency of deposit-taking SACCOs in the course of their operations. Efficiency analysis in the context of this study is an after effect with no researcher's interventions or influence, calling for a description of the facts as they exist.

B. Study Location: With the distribution of DTS spread across the country, DTSs operating in both urban and rural areas across Kenya were involved in the study.

C. Study Duration: As a panel study, financial data of the licensed DTS reported through their certified financial statements between 2011 and 2016 were used.

D. Sample size, Subjects & selection method: Despite an initial target of 215 DTS**,** only 109 DTS that were fully licensed and in operation as at 31st December 2011 and remained in operation until the end 2016 financial year were used in the study given the need for balanced panel data. Annual Financial statements filed with SASRA, the DTS regulator was the source of financial information used in the analysis.

E. Procedure methodology

A three-stage analysis procedure was used; first the estimation of technical efficiency was done using a non-parametric Data Envelopment Analysis (DEA), secondly, a fixed effect panel model was used to estimate

the influence of regulatory compliance on the technical efficiency and lastly, DTS size was introduced into the fixed effect panel model as a moderator between regulatory compliance and technical efficiency.

F. Statistical analysis

A non-parametric, Data Envelopment Analysis (DEA) approach was used as an efficiency estimation tool anchored on an intermediation approach and input orientation. The relationship between inputs and outputs was modeled under an intermediation approach viewing DTSs as mediators between the deficit and excess economic units in the financial system. The choice of the input orientation rides on the assumption that input quantities are primarily proxies to the economic factors of production and decision variables within the control of DTS management. Based on an input-output suitability test Total Deposits, Core Capital and Labour Cost were selected as inputs while Total Loans and Financial Investments were used as outputs.

Assuming that the number of DTS in the sample are *i* and each DTS uses *m* inputs and produces *n* outputs. If DTS_k is assumed to be one of *s* DTS, $1 \leq k \leq s$ and taking *m* inputs which are marked with $X^k{}_i$ ($i = 1... m$), and n outputs marked with $Y^k{}_j$ ($j = 1... n$). Taking efficiency the ,ratio of total outputs divided by total inputs, the efficiency of DTS_k was computed as:

The efficiency of DTS_k $= \frac{\sum_{j=1}^{n} u_{jY_j^k}}{\sum_{i=1}^{m} v_i X_i^k}$

$X_i^k, Y_j^k \geq 0, i = 1,\ldots, m, \; j = 1,\ldots n, k = 1,\ldots,s$

$u_j, \; V_i \; \geq 0, i = 1,\ldots, m, \; j = 1,\ldots n$

Where V_i, U_j are virtual multipliers (weights) for the *i* th input and the *j* th output. When the CCR model is considered, constant returns to scale (CRS) are assumed to apply; meaning that one unit of input delivers a fixed value of output. The BCC model, on the other hand, assumes variable returns to scale (VRS). In this study, the CCR dual model for estimating Overall Technical Efficiency (OTE) takes the following form;

Minimize

$$\theta - \varepsilon\left[\sum_{i=1}^{m} S_i^- + \sum_{k=1}^{n} S_j^+\right]$$

Subject to:

$$\sum_{i=1}^{s} \lambda_r X_i^r - \theta X_i^k + S_i^- = 0 \qquad i = 1, \ldots, m$$

$$\sum_{i=1}^{s} \lambda_r Y_j^r - S_i^+ = Y_j^r \qquad j = 1, \ldots, n$$

$$\lambda_r \geq 0 \quad r = 1,\ldots, s$$

$$S_i^- \geq 0 \quad i = 1,\ldots, m$$

$$S_j^+ \geq 0 \quad j = 1,\ldots, n$$

Where

θ = Efficiency of DTS

Si^- = A slack variable representing the input excess value

Sj^+ = Surplus variable representing the output shortfall value

ε = A non-Archimedean number representing a very small constant

λ_r = Proportion of referencing DTS_r when measuring the efficiency of DTS_k

To estimate the efficiencies under VRS, the CCR dual model above was subjected to the following additional constraint;

$$\sum_{r=1}^{s} \lambda_r = 1$$

The above constraint frees the CCR model from a CRS assumption and introduces a VRS orientation to the efficiency estimation. Efficiency scores obtained from CCR model represents the overall technical efficiency (OTE) scores and are confounded by scale efficiencies while those that are obtained from the BCC model are pure technical efficiency (PTE) scores and devoid of scale efficiency effects. Consequently, Scale efficiency

(SE) for each DMU was determined by a ratio of OTE score to PTE score. DEA efficiency scores are relative efficiency index and violate the independence within the sample assumption required by regression analysis. To overcome this limitation, bias-corrected technical efficiency scores were generated based on a bootstrapping technique advocated by Simar and Wilson (1998). The entire efficiency estimation process was done using the Benchmarking package embedded in R software.

In the second phase, fixed effect regression models were fitted using the bias-corrected efficiency estimates obtained from DEA as the dependent variable, and the compliance status on prudential requirements indicators as independent variables was carried out based on the following model:

$$\theta_{it} = \beta o + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \varepsilon_{it}$$

Where

i = 1, 2…110,

t = 1, 2, 3,4,5,6

θ_{it} = Bias Corrected Technical efficiency scores of DTS i at time t

β_i = Coefficients to be estimated ($i = 0...4$)

X_{1it} = Capital requirement Compliance of DTS i at time t

X_{2it} = Liquidity requirement compliance of DTS i at time t

X_{3it} = Asset Quality requirement compliance of DTS i at time t

X_{4it} = Investment requirements compliance of DTS i at time t

ε_{it} = Error Term

The introduction of the moderating variable into the model was done through a dummy variable (Z)

$$\theta_i = \beta o + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + Z(\beta m + X_{1it} + \beta m_2 X_{2it} + \beta m_3 X_{3it} + \beta m_{4it} X_{4it}) + \varepsilon_{it}$$

Where: β_i ($i = 0….4$) X_i (i = 1…4) & ε are as defined in equation (3)

βm_i (i =0…..4) Are coefficients of the moderated/interaction term

Z = Dummy variable for DTS size:

Z = 1 if Large DTS (total assets > 1 Billion shillings)

Z = 0 if Small (Total Assets ≤ 1 Billion shillings)

The significance of the moderating DTS size coefficients was tested using the F change statistics at 0.05 levels of significance.

III. Result

A. Technical Efficiency Estimation

Selecting the right combination of inputs and outputs in DEA analysis is paramount if the estimated efficiency scores are to be a true representation of managerial allocate quality. The levels of control over the specific input and the direct influence that the selected SACCOs have on the output underpins the choice of inputs and outputs. Based on this framework, total deposits, capital and labor costs were selected as inputs while total loans and financial investments were selected as outputs. In the six-year under review (2011- 2016), the mean annual deposits increased from 1.116 billion shilling in 2011 to 2.341 Billion shillings in 2016, representing a 109% increase over the six-year period. The Mean annual core capital more than tripled over the same period from 136.6 million shillings to 539.8 million shilling, a growth that is more attributed to the concerted effort by DTS to meet higher capital adequacy ratios introduced by the SASRAs DTS regulations 2010. The average labor cost over the same period increased marginally from 30.3 million in 2011 to 59.7 million shilling having attained the highest level in 2015 at 60.3 million shilling repressing a 97% growth in six years. The growth in outputs follows a similar trend as inputs. Over the six-year period, the average annual gross loans increased consistently form 1.331 billion shillings in 2011 to 2.591 billion shillings, a 94.7% increase over the six years under review. The average investments over the same period marginally increased by 64.7% from 65.5 million shillings in 2011 to 107.9 million shillings in 2016.

Data Envelopment Analysis, a non-parametric linear programming technique based on input orientation and variable return to scale were used to estimate the DTS intermediation technical efficiency scores based on the

three inputs and two outputs. Over the six-year period, the mean Technical efficiency of the sampled DTSs was 72.9%. A year to year review shows that the technical efficiency significant dropped in 2012 by 2.4% compared to 2011, followed by a consistent increase between 2013 and 2015. Notably, there was also a 19% drop in 2016 to a mean of 59.2% compared to 78.2% mean efficiency in 2015.

The estimation of efficiency score through DEA is based on a comparison of efficiencies of the individual DMU relative to an efficient frontier generated by a combined set of all DMUs[17]. This means that the efficiency scores are relatively efficient index rather than an absolute index. Where efficiency scores are part of an estimation or predictive model, Chernik & LaBudde, cautions that the assumption of independence within the sample is violated and consequently the estimated coefficients are inherently biased and inconsistent[18]. In addressing this shortcoming, Simar and Wilson[17] proposed a bias correction procedure based on a bootstrapping technique as discussed in the methodology chapter. A bootstrapping procedure based on 200 bootstrap samples selecting five DTS with replacement was implemented using DEA package running on statistical R software.

B. DTS compliance levels

A total of four compliance ratio set out for DTs by SASRA were adopted as indicators of regulatory compliance. A comparison between the minimum and maximum compliance limits set out by SASRA and the actual ratios achieved by individual DTS in the four regulatory ratios, the proportion of DTSs that were compliant in the specific ratios over the six years were as indicated in Figure 1.

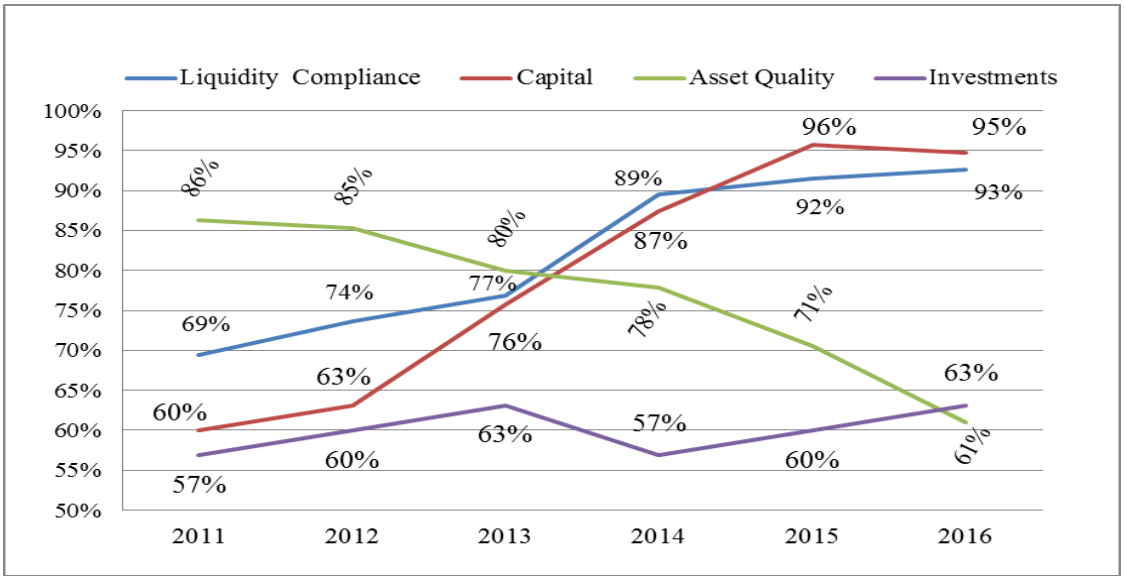

Figure 1: compliance Levels of DTS between 2011 and 2016

Mixed results were evident in progress towards full compliance in the four regulatory areas. There was a significant improvement in the proportion of DTS attaining compliance in both capital and liquidity ratio. However, there was a significant drop in the number of DTS meeting the set asset quality ratio while the proportion of DTS achieving compliance in investment ration remained stagnant at an average of 61%.

The choice of fixed effect model incorporating time dummies as an estimation model was arrived at after the results of an overlay graph analysis, Hausman test and time dummy probability test indicating its preference as a better estimation model. Similar to prerequisite to OLS regression model estimation, fixed effects models are subject to a number of assumptions that must be met for coefficient estimated to be unbiased and efficient. Testing for homoscedasticity across both time and individual DMUs, normality of residuals, absence of serial correlation, multicollinearity and specification bias are prerequisites test for accurate inferences. All the assumption were found to hold with the exception of homo-scedasticity calling for the use of hetero-scedastic robust standard errors also known as Huber/White or sandwich estimators instead.

C. The Moderation Effect of Size

By classifying DTS into two categories; large (those with total assets greater 1 Billion Shillings) and small DTSs holding assets less than 1 billion shillings, two fixed effect models were estimated. The first model fitting biased corrected Technical efficiency score against DTS compliance status on capital, liquidity, asset quality and investment requirements as See table 1. In the second model, a dummy variable representing the DTS size was introduced in the initial estimation model as seen in Table 2.

Table 1: Fixed Effect Estimation Results for Non-moderated model

	Coefficient	Robust SE	t	P>|t|
Constant	0.5923	0.0229	25.91	0.000
Liquidity Compliance	-0.0241	0.0164	-1.47	0.145
Capital Compliance	-0.0663	0.0128	-5.16	0.000
Asset Quality Compliance	-0.0062	0.0167	-0.37	0.710
Investment Compliance	-0.0722	0.0176	-4.1	0.000
YEAR				
2012	-0.0245	0.0088	-2.78	0.007
2013	-0.0559	0.0115	-4.86	0.000
2014	-0.0698	0.0145	-4.8	0.000
2015	-0.0848	0.0182	-4.67	0.000
2016	-0.0730	0.0200	-3.65	0.000
Dependent Variable: Bias corrected Technical Efficiency scores				

$F(4, 94) = 21.26$, $P < 0.000$. R^2 (within) = 0.2124, R^2 (Between) = 0.0493, R^2 (overall) = 0.1201

Despite the failure to attain statistical significance, DTS that achieved compliant by maintaining liquidity ratio greater than the recommended 15% were on average 2.41% less efficient compared to non-compliant DTS holding other factors constant. Similarly, those that maintained the proportion of loan provisions of less than 5% of their total loan portfolio were 0.62 % less efficient compared to DTS that were non-compliant holding all other factors constant. Unlike compliance with liquidity and asset quality ratios, meeting the minimum capital and investment required ratios were significantly influencing the technical efficiency of DTS. DTS that maintained a core capital to total assets ratio greater than 10% on average were 6.63% ($p < 0.000$) less efficiency while those maintaining a ratio of less than 5% ratio in financial investments to total deposits that were compliant were 7.22 % less efficient on average than those that were not complaint holding all other factors constant.

The initially fixed effect estimation was devoid of the influence associated with the economies of scale associated with the size of the individual DTS. In the second estimation, a dummy variable placing the DTSs into two categories; large (Total Assets > Kshs 1 Billion) and small (Total Assets < Kshs 1 Billion) was introduced as a moderator with the resulting coefficient estimates indicating minimal change as seen in Table 2.

Contrary to the expected significant positive influence of size on the resulting efficiencies as advanced by the proponents of economies of scale theory, introducing DTS size as a moderator did not generate significant changes in the coefficients of all the four DTS compliance indicators, an indication that larger compliant DTS did not enjoy better technical efficiency than small DTS in compliance with all the four prudential ratios, *ceteris paribus*.

Table 2: Moderated Fixed Effect Model Estimation Results

	Coefficients.	Robust Std. Err.	t	P> |t|
Constant	0.6125	0.0290	21.08	0.000

Liquidity Compliance	-0.0262	0.0239	-1.1	0.276
Capital Compliance	-0.0914	0.0187	-4.89	0.000
Asset Quality Compliance	-0.0222	0.0174	-1.28	0.204
Investment Compliance	-0.0737	0.0210	-3.51	0.001
DTS Size	-0.0232	0.0434	-0.54	0.593
DTS Size * Liquidity	-0.0017	0.0338	-0.05	0.959
DTS Size* Capital	0.0431	0.0226	1.91	0.059
DTS Size* Asset Quality	0.0294	0.0269	1.09	0.279
DTS Size *Investment	0.0043	0.0318	0.13	0.894
2012	-0.0248	0.0094	-2.63	0.010
2013	-0.0558	0.0118	-4.71	0.000
2014	-0.0722	0.0156	-4.64	0.000
2015	-0.0894	0.0183	-4.89	0.000
2016	-0.0811	0.0209	-3.87	0.000
Dependent variable: Bias Corrected Technical efficiency scores				
F (14, 94) = 10.04, P-Value (F) = 0.000 R^2 (Within) = 0.3060 R^2 (Between) = 0.0851 R^2 (overall) = 0.1482				

To arrive at a definitive conclusion on the moderating effect of DTS size, a null hypothesis equating all interaction coefficients to zero was tested. A resulting F statistic of 1.30, ($P > 0.05$) value exceeding the set significance level of 0.05 led to the acceptance of the null hypothesis. Intuitively, this meant that DTS size does not significantly moderate between DTS compliance status and their inherent technical efficiency holding all other factors constant.

IV. Discussion

The introduction of prudential regulations in Kenya was intended to safeguard member's deposits, promote prudent management, drive financial inclusion and enhance acceptability of the Sacco sector as an alternative to the mainstream banking systems. Despite such a noble intent, stringent regulations are evidently restricting allocative decisions and the resulting efficiencies in the sub-sector. Enhanced compliance with the liquidity ratio is an indications that most DTSs are in a better position of meeting their short-term obligation on demand deposits and other short-term liabilities. While moderate liquidity enhances transactional efficiency, excess liquidity impairs efficiency as it translates into an idle resource with no returns and increased liquidity management costs, a likely case with the current evidence.

The deviation of the current findings from the conventional liquidity theory where a positive influence was expected between compliance with liquidity ratio and efficiency can be attributed to unique operating principles in cooperative and how DTS have responded to the compliance call. Based on the observation of SASRA (2016), a perceived entitlement to loans, once a member has met minimal requirements, has consistently piled pressure on the liquidity levels of DTS, a position that has placed its managers with little or no control over allocation of liquid resources as most of it is channeled to lending. Continued pressure from the regulator for all DTS to comply with the statutory ratio often accompanied by far-reaching penalties and threats of deregistration, may have forced DTS only to meet the minimum requirement.

Contrary to the improvement seen in compliance with liquidity, a significant reduction on the proportion of DTS maintain asset quality ratios within the prescribed regulatory levels was notable, a trend that denotes increased lending risks and suboptimal credit management strategies. Compliance in the current context means less diversification of investments in favor of liquidity. At lower levels of income diversification, financial intermediaries are better placed to exploit the benefits of economies of scope and provide core services at a lower per unit cost [19]. SASRA's capping of investments in non-government backed securities at 5% and with investments in government securities accounting for a paltry one 1% (SASRA 2016), a significant proportion of the DTS experience low levels of income diversification, is a likely source of inefficiency, compared to DTS that hold a more diversified investment portfolio.

While the intent of capping the ratio of core capital to assets by the regulator was to facilitate risk sharing and reduce of shareholder's moral hazard, maintaining the ratio beyond 10% could be counterproductive and efficiency dis-enhancing. The degree of regulatory scrutiny or pressure is often more on DTS that are non-compliant, those that barely meet the set minimum capital limits and less for highly capitalized entities that have shown consistency in compliance[20]. Consequently, managerial allocation decisions are more likely to be subject to critical evaluation, robust and potentially efficiency-enhancing among non-compliant DTS, compared to those that are in compliance.

In the context of the current findings, compliance status denotes less provision and archiving compliance should have been accompanied by better technical efficiency compared to DTSs that were non-compliant, a position that is contrary to the current findings. The most plausible reason could be attributed to DTS credit lending model anchored on the premise of guarantor-ship and deposits collateral, both of which cushions DTSs against bad loans [19]. With the majority of the DTS in compliance with this ratio, stringent monitoring and control of lending risks may have been downgraded from among the critical decision processes of DTS managers, compromising on effective allocation of the resultant liquidity and consequently the technical efficiency of the DTS

In recognition that higher economies of scale, better market experience, diversification of customer base and capability to mobilize resources varies with size, it would be expected that larger DTS will perform better than small DTSs. While DTS size based on accumulated assets may be seen as a source of efficiency by the proponents of economies of scale theory, it is however evident that it does not significantly intervene in the relationship between regulation and input resource deployment effectiveness in the DTS context. Subjecting all DTS irrespective of their size to a common regulatory framework would, therefore, be justifiable based on the current findings. Additionally, this confirms the suitability of relative regulatory ratios that rates each DTS based on their individual levels as compared to ratios pegged on a fixed value.

V. Conclusion

Deposit Taking Sacco's in Kenya continues to posts mixed result on the levels of compliance with the prudential ratios. Since that introduction of the existing regulatory framework, there has been a significant growth in the number of DTS achieving the set liquidity and capital ratios, while the number of DTS meeting the asset quality requirement has significantly declined. Notable also is stagnation in the levels of compliance achieved by DTSs on investment ratio. The level of compliance over the six years under review broadly points to a negative influence on the allocative decisions of DTS managers and hence driving in-efficiency. Maintaining liquidity ratios of greater than 15% and less than 5% in loan loss provision, despite bearing a negative influence on the DTS efficiency remains insignificant. However, maintaining core capital to total assets ration greater than 8% and financial investments below 5% of total deposits bears a significant negative influence on the allocation decisions made by DTS managers leading to lower technical efficiencies.

Conclusively this is an indication that compliance the current regulatory framework by DTS is negatively affecting the resulting technical efficiency of DTS in Kenya. Evidently, the size of DTS bears an insignificant influence on the way the prudential requirements set out for DTS influences the resulting technical efficiency. Irrespective of size, DTS managers are facing similar input allocation decision challenges, and large DTS do not enjoy the benefits of economies of scale. The allocative efficiency of a managerial decision within the DTS sector, therefore, is influenced by factors other than their size.

VI. References

i. *Ng'ombe, B. W. & Mikwamba, E. (2004). Know More About SACCO. A Handbook for SACCO study Circle Programme. Malawi Union of Savings and Credit Co-operative [MUSCCO], Lilongwe, Malawi*

ii. *Ombado, G, (2010). 'An Effective Capital Utilization with-in SACCOs enterprises' Accosca Newsletter July 2010. Vol 2, Issue 2*

iii. *Wanyama, F., Develtere, P. & Pollet, I. (2009). Reinventing the wheel? African cooperatives in a liberalized economic environment. Annals of Public and Co-operative Economics, 80 (3): 361-392.*

iv. *SASRA. (2012). SACCO Supervision Annual Report 2011 (Deposit Taking). SASRA Regulatory Authority. In-house publication. Available from www.sasra.go.ke*

v. *SASRA.(2014). SACCO Supervision Annual Report 2013 (Deposit Taking). SASRA Regulatory Authority. In-house publication. Available from www.sasra.go.ke*

vi. *SASRA.(2013). SACCO Supervision Annual Report 2012 (Deposit Taking). SASRA Regulatory Authority. In-house publication. Available from www.sasra.go.ke*

vii. *Biwott, M.K.(2017) Efficiency And Productivity Of Deposit Taking Cooperatives In A Regulatory Transition: Evidence From Kenya, International Journal of Economics, Commerce, and Management. Vol. V, Issue 11.*

viii. *Republic of Kenya (1997). Cooperatives in a Liberalized Economic Environment. Sessional Paper No. 6 of 1997. Nairobi: Government Printers.*

ix. *Carrilus.A (2011). Challenges facing Sacco Regulation in Africa.11th SACCA Congress: Swaziland. 12 (1). P. 42–48.*

x. *Government of Kenya (2008). Sacco's Societies Act. No 14, Government Printer.*

xi. *SASRA (2011). SACCO annual supervision report, 2010. In-house publication. , Available from www.sasra.go.ke*

xii. *Mbogo. S, (2010, June 23) stringent vetting could see a drastic drop in FOSAs. Business Daily. Retrieved from http://www.businessdailyafrica.com/Corporate-News/Stringent-vetting-could-see-drastic-drop-in-Fosas/-/539550/1187426/*

xiii. *Ochola P (2016b) A Two-Stage Study of Efficiency of Savings and Credit Cooperatives Societies In Kenya: An Application of Data Envelopment Analysis and Tobit Regression Modelling. International Journal Of Economics, Commerce and Management Vol. Iv, Issue 4, April 2016*

xiv. *Kivuvo, R.M., & Olweny, T. (2014). Financial performance analysis of Kenya's SACCO sector using the Altman Z Score model of corporate bankruptcy. International Journal of Business and Social Science, 5 (9), 34-52.*

xv. *Kothari, C. K & Gaurav, G. (2014), Research Methodology, Third Edition, New Age International Publishers, New Delhi*

xvi. *Sekaran, U., & Bougie, R. (2010). Research methods for business: A skill building Approaches (5th Ed.). Chichester: John Willey & Sons Ltd.*

xvii. *Simar, L. & Wilson, P. W. (2007), Estimation and inference in two-stage, semiparametric models of production processes. Journal of Econometrics, 136, 31-64.*

xviii. *Chernick, M. R., and LaBudde, R. A.(2011). An Introduction to Bootstrap Methods with Applications to R. 1st edition. Wiley Publishing, Hoboken, NJ.*

xix. *SASRA. (2016). SACCO Supervision Annual Report 2015 (Deposit Taking). SASRA Regulatory Authority. In-house publication. Available from www.sasra.go.ke*

xx. *Alhassan, A. L. (2015), 'Income Diversification and Bank Efficiency in an Emerging Market', Managerial Finance, Vol. 41, pp. 1318–35.*

xxi. *VanHoose, D. (2007). Theories of bank behavior under capital regulation. Journal of Banking & Finance 31: 3680–97*