MICROECONOMIC AND MACROECONOMIC DRIVERS OF X-INEFFICIENCIES OF COMMUNITY BANKS IN TANZANIA

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Abstract

Over a span of years efficiency in Tanzanian Community Banks (CBs) has been low. The specific and macroeconomic drivers of inefficiency, however, have not been uncovered. Using tobit regression and triangulation methods the study analysed the drivers of inefficiency and found that gross loans to total deposit (Gltd), bank size (logassts), return on average assets (RoaA) and capital adequacy ratio (Car1) were statistically significant and negatively related to most bank inefficiency measures; while net interest margin (Nim) was statistically significant and positively related to inefficiency. The effect of macroeconomic factors on inefficiencies was not uniform; with GDP having an unexpected statistically significant and positive relationship with inefficiencies. The positive relationship is seemingly explained by the decreasing contribution of agriculture to the Tanzanian GDP. Policy-wise, these findings imply that bank regulators need to encourage community banks to increase their asset base in order to control inefficiencies. Moreover, community banks' management need to reconcile between gross loan to deposit (Gltd) ratio and liquidity, as higher Gltd ratio may compromise optimal liquidity in banks. On the effect of Net interest margin (Nim), management should revisit their pricing policies in order not only to reduce inefficiencies but also to attract deposits from savers. With regard to the effect of GDP on inefficiency, community banks need to diversify in other sectors of the economy so as to mitigate excessive dependency on agricultural lending.

Key words: *Drivers of inefficiency, Cooperative banks, Community banks, X-inefficiency*

1.0 INTRODUCTION

The demand for efficient and regulated microfinance services in low income communities over the last six decades has been significantly high (World Bank, 2014; Ledgerwood 2013)[2]. To respond to the increasing demand, microfinance–oriented financial service providers have emerged nearly all over the world. They include Credit–based Microfinance Institutions (CMFIs), Savings and Credit Cooperative Societies (SACCOS), and Community Banks (CBs) (Kaleshu, 2013; Kessy, 2010).As opposed to other microfinance services providers, CBs world wide have proven their abilities to provide regulated microfinance services including deposits and credit while demonstrating high level of resilience to working with low income communities both in urban and rural financial markets (MacMahan, 2015; Olewapo and Ario, 2011; Hays*et al*, 2009; Lalika, 2006). However, recent studies have shown that CBs in Tanzania were operating inefficiently (Mataba and Aikaeli, 2016; Mataba, 2016).Inefficiency in CBs implies poor financial performance, leading to decreased capacity to address financial service demands in low income communities (Li and MacMahan, 2015; Hays *et al.*, 2009; Owusu-Frimpong, 2008; Berger *et al.*, 2004).

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[2]According to the World Bank (2014), about 2.5 billion working-age adults, which were more than half of the total adult world population in 2011, had no access to financial services delivered by regulated financial institutions. Although the number improved to 2.0 billion by 2014, the adult population without financial services was still significantly high as it accounted for about 38% of the world's adults.

Mataba and Aikaeli (2016) established that CBs were generally operating below efficiency frontier with regard to various measures of inefficiency. Cost Inefficiency (CIE) averaged at 64%, while Technical Inefficiency (TIE), which essentially constitutes X-inefficiency in banks, averaged at 37%. Furthermore, allocative inefficiency, which results from banks' failure to use input mix in an optimal combination at a given input prices, averaged at 48%. In order to effectively serve the low-income Tanzanian people and contribute to the overall objective of the financial sector reforms, CBs ought to conduct banking business efficiently.

In Tanzania, CBs became operational as a result of financial (banking) reforms–termed first generation banking reforms, initiated in 1991. As opposed to Traditional Commercial Banks (TCBs) whose main customers are corporate and middle class clients,CBs focus on local financial markets consisting mainly of poor and risky "unbankable" clients who are essentially the focus of the microfinance market. On the other hand, CBs receive deposits from the public, a specific characteristic which subjects CBs to banking regulations. This underlying and distinctive characteristic sets apart CBs from traditional Microfinance Institutions (MFIs) and other non-banking financial institutions serving the low income customers (Freixas and Rochet, 2008).In this paper, regulated microfinance services are defined as financial services the provision of which is directly supervised by the Central Bank; in this case, the Bank of Tanzania (BOT). Regulated microfinance services provided by CBs include savings services offered to the public.

The Financial Dictionary defines a community bank as an independent, locally-owned bank (having no national presence) operating exclusively in and deriving its funds from the community in which it is based. In Tanzania, the Banking and Financial Institutions (Capital Adequacy) Regulations 2014 defines a community bank as a financial institution serving a defined geographical area and whose primary activities are restricted to acceptance of deposits and lending and such other activities as may be specified by the Bank of Tanzania (BOT, 2014).Consistent with the definitions, two major types or categories of community banks, based on ownership structure, have evolved in the Tanzanian banking system, namely, Co-operative Community Banks (CCBs) and Non-Co-operative Community Banks (NCCBs) (BOT, 2014). While Co-operative community banks are member-owned, the Non-Co-operative Community banks are investor-based.

With the Tanzanian population reaching about 51 million out of which 64% live in poverty (as per Multidimensional Poverty Index) (UNDP, 2015), existence and operationalization of CBs in Tanzania provide a versatile opportunity for the poor households especially in the rural areas to access regulated microfinance services. The microfinance services offered by CBsin Tanzania have also been in the increase over a span of years. For instance, customer deposits collected by community banks increased from TZS 13.5 billion in 2006 to TZS 67.6 billion in 2016, which is an average increase of 40.1% per annum. Loan and advances to customers increased from TZS 10.3 billion in 2006 to TZS 61.4 billion in 2016, an average increase of 49.6% per annum (BOT, 2016).

Although CBs efforts are well felt in the Tanzanian banking market, only a few studies have addressed CBs' performance in term of frontier efficiency. In Tanzania, bank inefficiency studies appear to have been contextually-bound, concentrating mainly on TCBs whose main focus is corporate customers. Bank efficiency studies inCBs have received scanty research spotlight (see, for instance, Gwahula, 2013; Pastory*et al*. 2013; Aikaeli, 2008; Aikaeli, 2006).Given the contextual and operational divergences existing between CBs and TCBs,the empirical findings on inefficiency determinants in TCBs might not be generalized for CBs. Furthermore, studies indicate that the drivers of inefficiency also seem to be environment specific (Farhan *et al.*, 2012; Bourdriga *et al*, 2010).While previous studies (Mataba and Aikaeli, 2016; Mataba 2016; Lalika, 2006) have revealed considerable levels of inefficiencies in

the CBs, the corresponding drivers of inefficiencies were not uncovered. Furthermore, Bank of Tanzania (BOT) recently closed two CBs and gave a six month moratorium to some ailing community banks to improve performance. Thus, this study sets to identify and analyse bank specific and macroeconomic drivers of CBs' inefficiency in the wake of bank closure and the seemingly loss of public confidence in the community banking sub-sector in Tanzania. Identifying and analysing the drivers of inefficiency in community banks is paramount in order to inform bank managers and regulators the causes of inefficiencies and on how to deal with such inefficiencies.

On the other hand, being a young banking subsector in Tanzania, studies on drivers of inefficiencies provide pertinent information for bank regulators and policy makers to effectively nurture this important banking sub-sector. In this context, drivers of inefficiency are those factors or variables that lead to wastage of bank resources (Li and MacMahan, 2015;Berger *et al.*, 2004). The study was guided by the following null hypothesis: bank specific and macroeconomic factors do not impact inefficiencies in community banks. Its corresponding alternative hypothesis was: bank specific and macroeconomic factors do impact inefficiencies in community banks.

The rest of this paper is organized as follows: section two presents literature review, followed by methodology in section three. Section four presents and discusses the results while section five deals with conclusions and policy implications of the findings.

2.0 LITERATURE REVIEW

2.1 Efficiency and X-inefficiency concepts: A theoretical framework

The term efficiency refers to the ability to produce output with minimum resources. It measure show close a production unit gets to its production possibility frontier (Ally, 2013; Musonda, 2008; Mokhtar *et al.*, 2006). Inefficient banks have higher probability of failure, which endangers the whole financial system performance due to possible systemic effects (Podpiera & Weill, 2008). Berger and Mester (1997) consider two types of inefficiency measures, namely, cost and profit inefficiencies as the most important inefficiency measures. While profit inefficiency gives a measure of how far a bank is to producing the maximum possible profit given a particular level of input prices and output prices (and other variables), cost inefficiency measures how far a bank's cost is to what a best practice bank's cost would be for producing the same output bundle under the same conditions. The cost frontier model can be written in the general form (Coelli, *et al*, 2005) as follows:

$$C_i \geq c(w_{1i}, w_{2i}, ...w_{Ni}, q_{1i}, q_{2i}, ...q_{Mi}) \quad \text{..... (1)}$$

Where C_i is the observed cost of the bank; w_{ni} is the n-th input price; q_{mi} is the m-th output; and c (.) is a cost function of the best practice bank that is non-decreasing, linearly homogenous and concave in prices. It should be noted that the cost function gives the minimum cost of producing outputs q_{1i}, q_{2i},…,q_{Mi} when the bank faces input prices w_{1i}, w_{2i}, w_{Ni}. Equation 1 is saying that observed cost is greater than or equal to the cost of the best practice bank (i.e. minimum cost). When price data are available and if we assume that firms minimize cost, it is possible to estimate the economic characteristics of the bank production technology, and thus estimate cost efficiency using a cost frontier. Thus, Cost Efficiency (CE) of the i-th bank is calculated as:
$Ci / c(.)$

Or more precisely,

$$CE = \frac{w'_i x_i^*}{w_i' x_i} \quad \text{.....(2)}$$

That is, CE is the ratio of minimum cost to observed cost, for the i^{th} firm. Thus, in equation 2, cost efficiency is the ratio or proportion of cost or resources that are used efficiently given the output produced. For instance, if X uses Tshs in form of inputs to produce output k, while a similar bank Y in the industry uses Tshs 75,000 of inputs to produce the same k output under similar environment, then bank X is only 75% cost efficient (i.e. minimum cost/observed cost). This implies that bank X equivalently wastes 25% of its costs relative to a best-practice bank facing the same conditions, that is, it is 25% inefficient.

Cost inefficiency may arise from two different sources. One is technical inefficiency and the other is suboptimal allocation of resources (allocative inefficiency). Bad management, poor motivation, and weak work pressure consistent with technical inefficiency are blamed to be the major sources of inefficiency as they result in the underutilization of input resources or factors of production. In the terminology of Leibenstein (1966), this efficiency gap is termed "X-inefficiency". A series of Leibenstein's papers of 1966, 1975, 1977, and 1978 contributed to X-efficiency theory. X-efficiency theory describes the general efficiency of a firm in transforming inputs into outputs. Leibenstein (1966) identifies two possible sources of inefficiency. One is a divergence between price and marginal cost, named allocative inefficiency. This divergence may be caused by monopoly, taxes, regulations and other impediments to competitive output rates. Another type labelled X-inefficiency is the one which stems from the failure of firms to achieve the lowest possible cost functions for producing their goods, and this can account for wasted resources. Leibenstein (1966) showed that inefficiency deriving from X-inefficiency is significant in comparison to inefficiencies deriving from allocative inefficiency. Berger *et al.* (1993), when carrying out efficiency studies on USA commercial banks and contributing to X-efficiency theory, argued that X-inefficiency constitutes 20% or more of bank costs.

Under Data Envelopment Analysis (DEA), the frontier techniques used to estimate efficiency (and thus deriving inefficiency measures applied in this study), Technical Efficiency under Constant Return to Scale (TeCRS) is decomposed into two mutually exclusive components: Scale Efficiency (SE) and Pure Technical Efficiency (PTE).The decomposition of TeCRS into SE and PTE facilitates a closer look into the sources of inefficiencies. SE is concerned with the relationship between the levels of output against size of operation. A bank is said to be scale efficient when its size of operations is optimal so that any modification on its size will render the bank less efficient. The PTE measure is obtained by estimating the efficient frontier under the assumption of Variable Return to Scale (VRS). It is a measure of technical efficiency without scale efficiency and it purely reflects the managerial performance to organize the inputs in the production process (Kumar and Gulati, 2008). It relates to management's ability to avoid wastes by generating as much outputs as input usage allows or by using as little inputs as output production allows.PTE is also known as VRS technical efficiency (TeVRS). A bank is said to operate under Variable Return to Scale (VRS) if a proportionate increase in all its inputs results in greater or less than the proportionate increase in its outputs. The PTE measure or TeVRS is obtained as a ratio of CRS technical efficiency (TeCRS) to SE i.e. since TeCRS = TeVRS * SE; it implies that, SE= TeCRS/TeVRS. Therefore, to calculate SE we estimate TeCRS and TeVRS upon the same data. The TeVRS are always higher or equal to TeCRS and the difference between TeVRS and TeCRS is Scale Inefficiency (SIE).

2.2 Empirical background

Recent studies have seen massive efficiency studies in Traditional Commercial Banks (TCBs)(Iqbal and Awan, 2015; Ohene-Asare, 2011; Berger, 2007). However, there is little evidence that such studies took into account the specific factors that underlie inefficiency in the community banking sub-sector.

Iqbal and Awan (2015) examined technical, pure technical and scale efficiency in the insurance industry in Pakistan. They found that the major source of inefficiency was excess labour and shortfall in claim-settled amounts. However the scope of the study was limited to the insurance industry. The current study contributes to literature by studying factors that determine inefficiencies in community banks.

Sanchez *et al.* (2013) investigated the determinants of efficiency and dynamic efficiency changes in seven Latin American banking industries to evaluate the effect of financial liberalization. Allocative, technical, pure technical, and scale efficiency measures were calculated and analyzed using the DEA technique. The second stage efficiency analysis showed that Net interest margin (Nim) was negatively related to most measures of efficiency, which is consistent with the assertion that wider margins suggest lower competition (Demirgüç-Kunt and Levine, 1996). This study similarly applies the second stage efficiency analysis results to investigate the effect of various independent variables on inefficiency in Community Banks (CBs) in Tanzania.

Pasiouras*et al*. (2007) examined cost, technical and allocative efficiency in Greek co-operative banks using DEA and established that bank size had an impact on all measures of efficiency, but the impact of capitalization depended on the efficiency measure. They also found that the source of inefficiency was allocative rather than technical. Although the study provided some insights on the determinants of efficiency in the cooperative sector, the study was not inclusive enough to involve other non-cooperative community banks as it is in the current study.

Pančurová and Lyócsa (2013) studying bank efficiency in 11 transition economies in Central and Eastern Europe Countries (CEEC) applied DEA and found that both bank size and capitalization were positively related to cost efficiency and that the loans to assets ratio was negatively associated with cost efficiency. On the other hand, Havrylchyk (2006) examined the cost efficiency of the Polish banks and performed a two-stage efficiency analysis. He found that size and capitalization were not related to efficiency while total loans to total asset ratio was negative and significant implying that banks that were more aggressive in terms of loan disbursements (more risk taking) were less efficient. However these studies focused on traditional commercial banks in Eastern Europe and solely focused on TCBs without mention of CBs. This study contributes to the literature by bringing the dimension of determinants of inefficiency in CBs in a developing country.

Fewer banking studies on determinants of efficiency have been conducted in African banking systems. Hauner and Peiris (2008) studying 14 Ugandan commercial banks analyzed the effect of financial sector reforms on competition and efficiency for the period 1999-04. Using DEA to measure efficiency and Panzar and Rosse's (1987) model for competition, they ascertained that the level of competition had increased significantly and it had been associated with a rise in efficiency. Further findings indicated that, on average, larger banks and foreign-owned banks had become more efficient, while smaller banks were less efficient in the face of increased competitive pressures.

Magali and Dickson (2013) employed DEA approach to assess the technical efficiency of rural SACCOS in various regions in Tanzania. The study established that technical efficiency varied across regions and ranged between 46 to 62 percent. They also noted that higher costs of operations for rural SACCOS attributed to low efficiency. However, the determinants of inefficiency in CBs were not studied.

Aikaeli (2008) while studying the Tanzanian banking sector for the period 1998-04, employed DEA in estimation of technical and scale efficiency, while x-inefficiency was estimated

using a multi-product translog cost function. Aikaeli (2008) established that commercial banks operated on the decreasing part of their average cost curves which gave them room to expand with increasing returns to scale. He further established that the major drivers of x-inefficiency in banks were inadequate fixed capital, poor labour compensation, less management capacity as banks expanded, and the overwhelming accumulation of excess liquidity. However, the effects of liquidity and price margins on inefficiency of community banks were not examined. The current study is set to examine these effects.

Similarly, Cull and Spreng (2008) when examining the effect of bank privatization on efficiency in Tanzania reported that there were tensions between pursuing profitability and extending the outreach of a bank after privatization. This implies that access to banking services, especially among the relatively poor, might be sacrificed for the sake of improved efficiency. While studying the relationship between efficiency and Non-Performing Loans (NPLs) in the community banking sector for the period 2003-2014, Mataba (2016) found a negative relationship between CBs efficiency and GDP in Tanzania. These findings contradict the general theory in Traditional Commercial Banks (TCBs) that higher real GDP growth usually translates into more income which improves the debt servicing capacity of borrowers, hence lower NPLs (Makir *et al.,* 2014; Klein, 2013). With a highly expanding economy, Tanzania banking system including CBs has witnessed excessive bank lending to finance a "hot" economy. Nevertheless the study did not examine the drivers of inefficiencies in the community banking sub-sector.

While the reviewed studies have examined efficiency performance in TCBs and Microfinance Institutions (MFIs), there is no evidence with regard to studies in CBs inefficiency given that CBs have unique characteristics that distinguish them from TCBs and MFIs. This study attempted to fill this gap by analyzing drivers of inefficiency in CBs in Tanzania.

3.0 METHODOLOGY

3.1 Research design

The study applied explanatory sequential research design by examining relationship between variables through analyzing quantitative panel data, followed by validating results using qualitative information from key informants. The mixed research design enhances the strength of research findings by exploiting the advantages of both approaches thus providing a more complete picture of the research phenomenon (Wachira, 2015). Further, the research design is appropriate for a cause-effect relationship study among variables over an extended period, and fits well for triangulation purposes (Kaleshu, 2013; Babbie, 2004).

Panel data, which constituted the major source of research data in this study, have the merit of using both cross-section and time-series analyses and they give information on the time-ordering of events, controlling for individual unobserved heterogeneity (Brüderl, 2005). They give "more variability", less collinearity among variables, more degree of freedom, and more efficiency (Hsiao and Hsiao, 2006; Hoffman *et al*., 2005). For a study of dynamic changes such as determinants of bank efficiency, the repeated cross-section of observations overtime suits in very well (Hsiao and Hsiao, 2006).

3.2 Scope, data sources, and sampling

The study covered the period from 2002 to 2017. The year 2002 was chosen as a starting period to capture the effects of the first and second financial (banking) reforms in the country. This was also the period when a significant number of CBs featured prominently in response to the financial reforms in Tanzania. Panel data, which were the key source of information, were sourced from both Bank of Tanzania (BOT) and audited accounts of the respective CBs, thus portraying evidence of reliability given the reputable nature of those sources. The other source

was primary data gathered from key informants at BOT and CBs using Key Informant Checklist. The purpose of using the primary source was to validate/triangulate some findings generated from panel data analysis. Since banks that have been in the industry for less than five years are considered inappropriate for gauging their general performance (Richard, 2010), the study applied purposeful sampling in selecting CBs for the study. Accordingly, only CBs that existed by 2010 were included in the sample. The final sample consisted of an unbalanced panel of nine (9) CBs in the period 2002-2017 with a total of 98-bank –year observations. With 90% of CBs having been included in the sample, it was considered to be quite representative the findings from which could be generalized to all CBs in Tanzania.

3.3 Modeling the drivers of inefficiency in CBs

The factors that drive inefficiencies in CBs were analyzed by running a tobit regression model as applied by Aikaeli (2006), Pasiouras *et al*. (2007) and Isik and Hasan (2003). Tobit regression model is appropriate for a dependent variable whose values are constrained in some way (Gujarat, 2004), which is characteristic of the dependent variables in this study. Since the possible measures of efficiency range between 0 percent and 100 percent (alternatively between 0 and 1), and since inefficiency level = 100 - efficiency level attained; correspondingly; all inefficiency measures in this study lie between 0 and 100 percent. This implies that, using the Ordinary Least Square (OLS) would give inconsistent results (Pasiouras*et al*., 2007; Tobin, 1958).

The model was specified with inefficiency indexes as functions of regressors hypothesized as drivers of inefficiency in CBs:

$$InEff_{it} = f(x_{1it}, x_{2it}, ..., x_{kit}) \quad \text{.....(3)}$$

A complete obit regression model used in this study took the form:

$$InEff_{it} = \beta_0 + \beta_1 Gltd_{it} + \beta_2 RoaA_{it} + \beta_3 Car1_{it} + \beta_4 Logassts_{it} + \beta_5 Nim_{it} + \beta_6 cbf_{it} + \beta_7 \log gdp_{it} + \beta_8 Lrates_{it} + \xi_{it} \quad \text{.....(4)}$$

Where $InEff_i$ are dependent variables (inefficiency scores) calculated earlier by DEA and they represent Cost Inefficiency (CIE), Technical Inefficiency under CRS conditions (TeICRS), Technical Inefficiency under VRS conditions (TeIVRS), Scale Inefficiency (SIE) and Allocative Inefficiency (AIE).

The exogenous/independent variables in the model were proxied as follows: Gross loan to total deposit (Gltd) ratio; Return on average Assets(RoaA);capital adequacy ratio (Car1) calculated as the ratio of bank core capital to risk-weighted assets plus off-balance sheet exposure; bank size (logAssts) measured in terms of the logarithm of total bank assets; Net interest margin (Nim) calculated as interest income less interest expenses over average earning assets; cbf, a dummy variable denoted the effect of the cooperative banking factor on bank inefficiency. Other independent variables examined include the GDP (loggdp) and market lending rates (lrates). It should be noted that familiar residual based tests inferring heteroskedasticity, serial correlation and normality in standard regression models are not directly appropriate for latent variable regression models such as Tobit (Jeong and Jeong, 2010; Reynolds and Shonkwiller, 1991). A summary of *a priori* relationships between tobit regression variables (positive or negative) are shown in Table 1.

Table 1: Expected relationships between variables of interest under study

Variables	Gltd	RoaA	Car1	loassts	Nim	Cbf	logdp	Lrates	Supporting Literature
CIE	(-)	(-)	(-)	(-)	(+)	(+)	(-)	(+)	Pančurová and Lyócsa (2013)Sanchez *et al*. (2013)
TeICRS	(-)	(-)	(-)	(-)	(+)	(+)	(-)	(+)	Pasiouras*et al*. (2007)
TeIVRS	(-)	(-)	(-)	(-)	(+)	(+)	(-)	(+)	Sanchez *et al.* (2013).
SIE	(-)	(-)	(-)	(-)	(+)	(+)	(-)	(+)	Sanchez *et al*. (2013)
AIE	(-)	(-)	(-)	(-)	(+)	(+)	(-)	(+)	Havrylchyk (2006)

Source: Constructed from literature review. **Key;** CIE: Cost Inefficiency; TeICRS: Technical Inefficiency under Constant Returns to Scale; TeIVRS: Technical Inefficiency under Variable Returns to Scale; SIE: Scale Inefficiency; AIE: Allocative Inefficiency**. Note**: signs in bracket indicate expected relationship between corresponding variables

4.0 EMPIRICAL RESULTS

4.1 Descriptive Analysis

Table 2 provides summary statistics for various inefficiency measures in this study. Table 2, which was constructed from DEA outputs, provides a summary of inefficiency in terms of overall average scores for the period under study.

Table 2: Summary statistics of various Inefficiency measures

Variable	Obs	Mean	Std. Dev	Min	Max
CE	98	0.66192	0.315 7	0.0000	0.8312
TeCRS	98	0.38447	0.192 3	0.0000	0.8879
TeVRS	98	0.34113	0.277 6	0.0003	0.8416
SE	98	0.09115	0.182 5	0.0000	0.5561
AE	98	0.49661	0.373 2	0.0000	0.6411

Source: Summarized from data set

Except for scale efficiency, a general noticeable observation on efficiency score is that, by and large, CBs in Tanzania performed poorly during the study period (2002-17) with cost inefficiency being the highest of all inefficiency measures. As it will be eluded in the next section, high cost inefficiency seems to be a result of additional expenses incurred to build social capital of the poor customers, and excessive burdens imposed through regulatory requirements.

4.3 Drivers of Inefficiency in Community Banks

Table 3 provides a summary of the Stata outputs regarding the relationships between independent bank specific and macroeconomic variables against the inefficiency measures serving as dependent variable one after the other. Gross loan to total deposit (Gltd) ratio, which is one of the pointers of liquidity in banks, was statistically significant and positively related to all measures of inefficiency. This implies that higher ratios of gross loans to deposit tended to reduce inefficiencies in banks. As deposits are converted into more loans, CBs experience lower inefficiencies. This is consistent with the notion that efficiency level increases as the same inputs are used to generate more outputs. As one unit of deposit generates more loans, inefficiencies are reduced as deposit resources are used optimally. However, higher ratios of Gltd tend to compromise with the liquidity status of banks. As additional deposits are converted into more loans for efficiency gains, community banks tend to increase their liquidity risk as they remain with minimal liquidity to meet daily cash demand; a situation which may have devastating effects in case there is an unexpected increase in deposit demands from savers.

Table 3: Tobit regression results summary

Variable	CIE	TeICRS	TeIVRS	AIE	SIE
Gltd	-0.0032776***	-0.0058071***	-0.0045476***	-0.002219**	-0.0017673**
	(0.0009847)	(0.0007809)	(0.0009673)	(0.0009948)	(0.0006775)
RoaA	-.0348183	-0.0670522***	-0.0670725***	-0.0021638	0.003071**
	(0.0240326)	(0.0253425)	(0.0236066)	(0.0021099)	(0.0014425)
Carl	-.00770179*	-0.130633***	-0.1712735***	0.572194	0.0098025
	(0.044211)	(0.035121)	(0.0434272)	(0.0389525)	(0.0260678)
Logassts	-0.2600348***	-0.1419271***	-0.0548745	-.0.3086669***	-0.1019495***
	(0.0424271)	(0.0346097)	(0.0416749)	(0.0401826)	(0.0271177)
Nim	0.3858615**	0.4595106***	0.5084902***	0.0622828	-0.0372082
	(0.1853398)	(0.1517846)	(0.1820539)	(0.1933203)	(0.1319685)
Cbf	0.0161398	0.0462083	0.0826498**	-0.0201833	-0.0392542
	(0.0382936)	(0.03364)	(0.0376147)	(0.0401488)	(0.0274384)
Loggdp	0.3449687***	0.0974666	0.1645411*	0.4755344***	-0.0949577
	(0.095148)	(0.784271)	(0.0967682)	(0.0922685)	(0.0626854)
Lrates	-0.052269*	-0.0158877	-0.0308518	-0.0390925	0.0244061
	(0.0269922)	(0.0214051)	(0.0265137)	(0.0282986)	(0.0193542)

Source: Stata version 11.1 analysis.**Key**: CIE: Cost Inefficiency; TeICRS: Technical Inefficiency under Constant Returns to Scale; TeIVRS: Technical Inefficiency under Variable Returns to Scale; SIE: Scale Inefficiency; AIE: Allocative Inefficiency;Gltd: Gross loans to deposits; RoaA: Return on average assets; Carl: Capital adequacy ratio; logAsst: bank size; Nim: Net Interest margin; cbf: dummy variable indicating co-operative banking factor; loggdp: GGross domestic product; and lrates: lending rates.**Note:** ** and *** denote significance level at 5 and 1% respectively. Standard errors are shown in brackets.

The problem is likely to be more serious especially in community banks because demand deposits are the main sources of liquidity. If the situation is not well checked it may culminate into bank runs. For instance, in 2014 the Gltd ratios in most CBs were adverse, reaching as higher as 129% against the best rating of 70% or below as per BOT's CAMELS standards. This indicates that CBs were over-lending the clients' deposits.

When CBs management were consulted to explain the situation, it was found that deposits mobilized from clients were not enough to match with the loan demands resulting into deposit over-lending. One commented:

> *"…We are faced with hard-hitting dilemma. While we are restricted to lend not more than 80% of the deposits mobilized, the demand for loans is too high. Unfortunately, we don't have other fund sources than deposits. Borrowing from commercial banks is not feasible due to high interest charged by commercial banks…" (Interview, May 5, 2017).*

This further implies that lending opportunities are lost because of low levels of deposits mobilized. Although higher Gltd ratio is preferred from the efficiency point of view (due to the fact that higher ratios reduce inefficiencies in banks), it may not be safe for liquidity considerations.

The effect of bank profitability on bank inefficiencies was also explored using RoaA (Return on average Assets). While Cost Inefficiency (CIE) and Allocative Inefficiency (AIE) were not significantly affected by RoaA, TeICRS, TeIVRS and SIE were negatively driven by RoaA, implying that, as profitability on the employment of assets increases, inefficiency in the use of internal resources decreases. Stated differently, as the inefficiency in the use of internal resources decreases, so are the positive effects on profitability. These findings have some wider implications. As it can be noted, CIE and AIE were not (statistically) significantly affected by RoaA. This implies that a larger proportion of cost inefficiency in CBs arises from sub-optimal allocation of resources resulting from uncontrollable allocative inefficiency factors, rather than technical inefficiencies (X-inefficiencies).

These findings are inconsistent with X-efficiency theory but consistent with empirical findings of Pasiouras*et al.* (2007). Cost spending to raise business and financial literacy capacity of the poor clients and excessive regulatory burden imposed to CBs were cited by key informants as major sources of cost inefficiency in community banks in Tanzania. Similarly, the effect of capital adequacy ratio (Car1) on TeICRS and TeIVRS was negative and statistically significant indicating the positive effect of increasing capitalization on reducing X-inefficiencies. These results are consistent with the theory that high stake ownership (arising from increased capitalization) tend to monitor management more effectively, resulting in reduced inefficiencies. The weakor insignificant effect of capital adequacy on CIE and AIE seems to suggest a limited influence of capitalization on inefficiencies caused by factors outside the control of management.

Except for Technical Efficiency under Variable Returns to Scale (TeIVRS), bank size (logassts) was significantly negatively related to all measures of inefficiencies implying that, as bank size increased in terms of asset size, inefficiencies decreased in banks. This probably explains the effects of size economies on bank performance. However, most community banks in Tanzania are small with limited loan portfolio and limited working facilities that render them inefficient. During discussions with some key informants in some community banks, it was revealed that most community banks cannot afford to buy better working facilities, which in turn affect their efficiency. One key informant revealed:

> *"…Our core banking system is not efficient. The output generated bear many errors of which you have to spend much time to correct. We are spending a lot of money to service it, yet we cannot buy a better one as it is very expensive…" (Interview, May 5, 2017).*

Another interviewee said:

> *"…Although we are trying to get the maximum loan portfolio out of the meager deposits we receive from our poor clients which of course bolster our efficiency, the returns we get are not sufficient to meet all the operational costs we incur, thus the efficiency benefits arising from loans are just offset by the increasing operational costs…" (Interview, May 3, 2017).*

From the quotes it can be inferred that, although the bank management have been trying hard to make use of the resources available, the costs associated with malfunctioning of the core banking systems and increasing operational costs seem to offset the benefits, hence inefficiencies.

On the other hand, Net interest margin (Nim), which is a proxy of the pricing policy in banks was significantly positively related to CIE, TeICRS and TeVRS, implying that as interest on loans increases without a corresponding increase on deposit, inefficiencies in banks tend to increase as well. The positive association corresponds with the view that larger interest margins signify insensitivity to competition which in turn results in increased inefficiency (Sanchez *et al*, 2013). One interesting observation was that most of the CBs that set higher interest rates on loans were also the ones which paid minimal interest rates on deposits. When some key informants from the banks' management were consulted to explain this disparity, cost recovery due to increasing social intermediation costs was cited as the major reason. One said: *"…It is very expensive to provide banking services to the poor; you need to train them first before you lend them money, otherwise you may lose it all…"* (Interview, May 7, 2018). To elaborate, the informants insisted that a significant number of their clients were financially illiterate and did not own official securities to be used as collaterals. It was therefore important to organize them into groups so that they could receive intensive training on financial literacy before accessing

financial services. Apart from receiving the training, the groups so formed were used as loan guarantors and loan monitors against the borrowing member.

Although high interest margins were justified on grounds of cost recovery, they seemed to act against the efforts to mobilize deposits. There was no incentive for clients to deposit their money into banks that offered very minimal interest on deposits while charging high interest rates on loans. Therefore bank managers have had the role to reconcile between recovering the cost against attracting deposits from clients.

The effect of the cooperative banking factor on bank inefficiency was examined through a dummy variable (cbf). Except for TeIVRS, the effect of the variable was statistically insignificant to all measures of inefficiencies. This indicates that bank uniqueness as manifested in banks categories did not matter when it comes to inefficiency. The application of uniform regulatory framework with no regard to all bank categories seems to explain the indifference.
The effects of macroeconomic factors on bank inefficiencies were explored through the GDP (loggdp) and market lending rates (lrates). While the effect of lrates was insignificant, GDP was statistically and significantly positively related Cost Inefficiency (CIE) and Allocative Inefficiency (AIE). The positive association of GDP with CIE and AIE is a bit surprising as one would expect a negative association due to the fact that a healthy economy consistent with increasing GDP should be associated with decreasing inefficiencies as GDP increase is an indication of optimal use of resources. However, although the Tanzanian economy has generally been growing, the major contributors have been mining and some service sectors including tourism, transportation, communication and construction. The contribution of agriculture to GDP, which forms a major lending market for the community banks, has been decreasing overtime (World Bank, 2015). More importantly, when the economy of a developing country is growing consistent with an increasing GDP, banks tend to increase their lending in order to finance an expanding 'hot' economy. In such a situation there is a tendency for banks to by-pass the duly diligence criterion for the sake of profit making (i.e. excessive risk taking behaviour). However, small banks, more specifically CBs, tend to suffer heavily in terms of increasing NPLs as they lack resources to track down multiple borrowers who take advantage of the lending spree of banks, underdeveloped credit bureaus and weak legal structures inherent in developing countries (Mataba, 2016). Generally, this explains the positive relationship between GDP and CBs' inefficiency.

5.0 CONCLUSION AND POLICY IMPLICATIONS

The study made use of the X-efficiency theory to analyze and discuss the drivers of inefficiencies in community banks in Tanzania. While X-inefficiency theory alleges that the major source of inefficiency in firms is bad management, poor motivation, and weak work pressure consistent with technical inefficiency, the findings indicate that sub-optimal allocation of resources was a major source of inefficiencies in community banks. The inconsistence with X-inefficiency theory in community banks seems to be linked with excessive regulatory burden imposed to the community banking sector. Development costs incurred to support financial literacy in the poor communities add up to inefficiencies.

With regard to the null hypothesis stated in section 1.0, which states that bank specific and macroeconomic factors do not impact inefficiencies in community banks, the hypothesis is rejected. The findings indicate that Gross loans to total deposit (Gltd), bank size (logassts), return on average assets (RoaA) and capital adequacy ratio (Car1) were statistically significant and negatively related to most bank inefficiency measures implying that inefficiencies in community could be minimized by the increase in bank size, ratios of gross loan to total deposits, return on use of assets and capitalization. It was also found that, although higher ratios of Gltd increased efficiency gains, higher ratios (above 70%) were in conflict with regulatory requirements as they could result into liquidity shortages in the long run. Net interest margins

(Nim) was statistically significant but with a positive relationship with inefficiency. The positive relationship underscores the counterproductive nature of higher price margins which not only underlies inefficiency but also undermines deposit mobilization efforts from savers. The effect of macroeconomic factors on inefficiencies was not uniform. The effect of market lending rates was not significant while GDP had an unexpected positive effect on inefficiencies implying a decreasing contribution of agriculture to GDP in Tanzania.

One of the major implications of the findings is that, while inefficiency is driven by many factors as it has been revealed, the effect of expanding GDP on CBs' inefficiency is paramount. The positive relationship between GDP and inefficiency is explained by increasing Non-Performing Loans (NPLs). Some borrowers tend to take advantage of high lending spree during expanding economy by taking multiple loans leading to default. Lack of water tight legal structure, underdeveloped credit bureaus and lack of resources to track down defaulters lead to increasing NPLs in community banks, which in turn results in bank inefficiency.

These findings have policy implications. Bank regulators should require community banks to increase their asset base in order to curb inefficiency. This can be done through additional investment by existing shareholders or/and through issue of new shares. Regarding the effect of gross loans to total deposit, community banks management need to balance between reducing inefficiency and maintaining the optimal liquidity as higher Gltd may compromise optimal liquidity levels in banks. On the effect of Net interest margin, bank management need to revisit their pricing policies in order not only to reduce inefficiencies but also to attract deposits. With respect to the effect of GPD on inefficiency, CBs should exercise extra duly diligence when extending loans during periods of expanding GDP.

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