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GEOGRAPHIC DIVERSIFICATION AND EFFICIENCY IN THE BANKING INDUSTRY. DOES BOARD COMPOSITION IN TERMS OF INDEPENDENT DIRECTORS' MATTER?

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ABSTRACT

This study aimed to investigate the moderating role of board composition in terms of independent directors on the relationship between geographic diversification and efficiency of commercial banks in Tanzania. The research employed balanced panel data from 15 commercial banks in Tanzania from 2012 to 2020. The formulated hypotheses were tested by Tobit Regression Analysis and DEA using STATA version 17. The findings indicated that geographic diversification had a significant and negative relationship with allocative and economic efficiency. The study also revealed that the positive and considerable board composition in terms of independent directors moderated the relationship between geographic diversification and the allocative and economic efficiency of commercial banks. We discovered empirically that moderating the role of independent directors on the relationship between geographic diversification and efficiency contributes to efficiency. Therefore, this study recommend policy makers, management and others regulatory authority to consider independent directors when planning for efficiency of a commercial banks in Tanzania.

Keywords: Board Composition, Independent Directors, Geographic Diversification, Commercial Banks, Tanzania.

1. INTRODUCTION

Financial liberalization, globalization and development process of innovation and technology have increased opportunities for commercial banks in the world to expand the scope of their activities through geographic diversification and achieve efficiency. (Vidyarthi, 2020; Jouida et al.,2017).

However, in banking industry, little is known about the impact of geographic diversification on efficiency, especially within the context of developing countries like Tanzania. Thus far, most of the findings are either based on developed countries or within the context of non-financial industry (Brahmana et al.2018).

Furthermore, the existing empirical evidence in literature concerning the relationship between geographic diversification and efficiency is inconsistent (Delbufalo et al.,2016). For instance, Sharma and Anand (2020) have suggested that the geographic diversification – bank performance relationship is positive. Goertz et al. (2016) argued that in USA banks, geographic diversification-performance relationship is negative. Such inconclusive results trigger the need for further examining the link of geographic diversification – efficiency in the banking industry regarding

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what contextual factor may intervene in that relationship. One such possible factor is the board composition in terms of independent directors, which is highly possible to affect strategic decision of a firm and hence its efficiency.

Besides that, previous scholars (Zheng &Tsai, 2019; Liang et.,,2020) indicated that little consideration is given to board composition variables (board size, independent directors, CEO-duality, CEO-ownership, family, ownership structure) in examining the corporate diversification-efficiency relationship.

In the same line, contradictory theoretical views and empirical results exists regarding the board composition (board size, independent director, CEO-duality) – bank efficiency relationship. (Zheng &Tsai,2019) The board composition variable can either be used as predictor variables or as moderator variables in examining efficiency of the bank, thus increase the theory in predicting efficiency.

Therefore, the study used board composition measured in term of independent director as the moderating variable because its effect on geographic diversification on efficiency of commercial banks was not well addressed thus filling the theoretical gap. To the best of the author's knowledge, none of the conducted studies have examined the moderating influence of board composition, specifically in terms of independent directors, on the association between geographic diversification on the efficiency of commercial banks in Tanzania. Hence this study filled the research gap and add to diversification literature.

Accordingly, the purpose of this study is first, to investigate whether geographic diversification affects commercial bank's efficiency and investigate whether the effect of geographic diversification on commercial bank's efficiency improves when interacts with board composition in terms of independent directors. The current study is the first empirical study focusing on the moderating role of board composition in term of independent directors, one of the vital corporate governance issues in the commercial bank industry context. This study makes a contribution to the literature by offering a unique dimension that the effect of geographic diversification differ, depending on the adoption of board composition measured in terms of independent outside directors .In addition ,the study offers practical implication to the practitioners, potential investors and others stakeholders in the banking industry, providing an insight that corporate governance structure incorporating independent directors needs to be considered to maximize the geographic diversification impact in relation to commercial bank's efficiency. Followings section comprehensively review relevant literature including theoretical background, empirical evidence and hypothesizes developments for the effect of geographic diversification on commercial bank's efficiency and the moderating effect of board composition in terms of independent directors. Chapter 3 indicates methodology, data, models, estimation methods and measurements. Chapter 4 presents the results and the discussion and limitation finalizing the chapter.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 The effect of geographic diversification on firm efficiency

Many researchers have focused on the reasons of firm adopting geographic diversification as a

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core corporate strategy and the relationship between geographic diversification and firm performance. According to the literature, different theories and perspectives have been suggested regarding the advantages and disadvantages of geographic diversification. (Song & Kang,2018).

A stream of researchers explains the benefits of geographic diversification based on a resource-based view, (Kang and Lee,2014; Garrido- Prada. Et al .2019). Some researchers grounded on the resource-based view, proposed that as firms undertake geographic diversification, generate synergies, economies of scope and scale, whereby core resources for building competitive advantages can be properly allocated, thus improving firm's efficiency (Garrido-Prado et al.2019). According to Barney(2001) who proposed the resource based view ,by establishing and reinforcing ,resources and capabilities while diversifying operations ,firms can obtain competitive advantages. On the other hand, based on the transaction cost theory as firms expand business activities into multiple markets, they become more complex being involved in complicated factors, including natural environments, regulations and culture diversity.(Song &Kang,2018). To deal with those complexities, internal transactions costs such as managerial, structural, co-ordinations and integrations costs increases and outweigh benefits of geographic diversification which lead to negative significant influence of firm performance. (Kang &Lee,2014).

From empirical examinations, based on theoretical backgrounds for benefits from diversification, some researchers found a positive relationship between geographic diversification and firm performance. Whereas empirical studies conducted by other scholars indicated a negative relationship supporting theoretical viewpoints about the costs of geographic diversifications.

With regards to the geographic diversification -firm performance relationship, a limited number of empirical studies have been conducted using a sample of commercial banks. For instances Sharma and Anand (2014) with a year of observations from 2001 to 2016 found that geographic diversification has a significant positive return to bank performance. Contrary to Goertz et al. (2014) in USA using examined the geographic diversification on bank performance from 1980 to 1990. The author finds negative effect of geographic diversification on bank performance.

Thus, the current study hypothesized that:
HI: The effect of geographic diversification on commercial bank efficiency in the Tanzania banking industry is significant and negative.

2.2 Moderating role of board composition in terms of independent outside directors

Board composition in terms of independent outside directors are those directors who are independent from management and free from any relationship that would materiality interfere with their exercise of judgements (Jensen and Murphy,1990; Wang,2014). Since, the problem of information asymmetry between headquarter and subsidiaries is severe in firms, board composition in terms of independent directors is important especially in the context of geographic diversification.

From perspective of agency theory, the interests of managers and shareholders are different. Jensen (1986) stated that the primary goal of shareholders and managers are the maximization of

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shareholders 'value and diversification to spread employment risk respectively. The decision to diversify may benefit managers because of the power and prestige associated with managing a bigger firm but it may have destructive effect on a firm value. Thus, inclusion of more independent outside directors can facilitate the monitoring and control over managers thereby reducing managerial opportunism and ensuring that managers act in the interest of investors.

However, some researchers have argued that inside directors have specialized knowledge and expertise about their organization that come from personal experience not available to independent outside directors. While independent outside directors may have difficulty in providing appropriate advice to firms as the information available to them is relatively limited, inside directors can more accurately assess management endeavor as they hold a superior familiarity with and access to internal information (Wang,2014). This implies that including a high ratio of board composition in terms of independent directors will be helpful for the efficiency of the firms.

The moderating effect of independent directors on the relationship between geographic diversification and commercial bank efficiency are little studied. However, positive moderating effect of independent outside director on the relationship between geographic diversification and commercial bank efficiency in this study.

H2: Board composition (independent directors) positively moderates the relationship between geographic diversification and efficiency.

3. METHODOLOGY

3.1 Data

The study followed a positivism research paradigm and selected sample of 15 local and foreign commercial banks based in Tanzania from 2012 to 2020 on a panel data. Financial data, annual report and banking trading information of the sampled commercial banks were all collected from the banks of Tanzania (BOT). The commercial banks were selected in the sample on the basis of the following three criteria.

(1). Availability of commercial bank data from 2012 to 2020 was a first criterion, which eliminated 18 banks for which data are not available.

(2)The bank which are registered as Islamic banks only were excluded to avoid any bias in favor of non-interest income. Thus, this criteria excluded one bank namely as Amana commercial bank.

(3). New banks established as a result of merge and acquisition transactions are continued structure of the acquired bank and the data of these banks are merged and accepted as a single bank. This last criterion included five commercial banks, which were involved in merger and acquisition transaction. Ultimately 15 commercial banks were finally included in the study. Thus, the maximum number of sample observations were 135 which were constructed from 15 commercial banks that meet the above criteria. In this study STATA version17.0 was used to help process the collected data.

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3.2 Dependent variable.
The efficiency of a firm was measured in this study using three indexes: technical efficiency (TE), allocative efficiency (AE), and economic efficiency (EF). Technical efficiency pertains to the firm's capacity to produce the maximum feasible output, while allocative efficiency refers to its ability to utilize inputs in optimal proportions based on their respective prices. Economic efficiency, on the other hand, is the amalgamation of both technical and allocative efficiency. These definitions were based on the works of Kariuki (2016) and Watkin (2013).

3.3 Independent variable: Geographic diversification.
There exist various methods to assess geographic diversification, including the Entropy Index, Modified Barry-Herfindahl index, Efficient Diversification measures, and Two-dimensional categorical measure. In this study, the Herfindahl-Hirschman index (HHI) was employed as the chosen measure of geographic diversification.

The measure of geographic diversification of commercial banks adopted in this study were based on the Herfindahl - Hirschman Index (HHI) as proposed in the other works of (Mercieca et al, 2007; Cotagno and Stefanclli, 2012). In particular the geographical HHI, (HHI-Geo) was built keeping in to account the distribution of the branches of an individual bank over the Tanzanian territory and measure the level of geographical diversification considering the region of the bank operations as the reference market. The diversification of commercial banks geographical is given as:

$$HHI_{GE} = \sum_{j=1}^{k} \left(\frac{Bank\ Branches\ in\ Region}{Total\ Bank\ Branches} \right)^2 \quad \text{.....(3.1)}$$

Whereby;
i represents the i bank, j represents the regional where it is located. (j = 1, 2, 3……k, where k is equal to Regional in 2020). The measure geographic diversification of a bank adopted in this study were based on the Herfindahl – Hirschman-index (HHI) as proposed in other works of (Mercieca et al. 2007; Cognos and stencil, 2012) in particular the geographical HHI, (HHI-Geo) was built keeping into account the distribution of the branches of an individual bank over the Tanzanian territory and measured the level of geographical diversification considering the region of the bank operation as the reference market.

3.4 Moderating variables: Board composition
The measure of board composition adopted in this study is based, on total number of non - executive directors divided by total board size as proposed in the work of (Ukemenam et al.2019, Bebeji et al., 2015). Board size is the number of directors on the board (Tarus &Aime,2014).

3.5 Control variables
The purpose of this study is to control for specific variables that may have an impact on the efficiency measure, namely Technical Efficiency (TE), Allocative Efficiency (AE), and Economic Efficiency (EF). The control variables utilized in this research are total deposits, which are

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measured as the proportion of deposits to total assets (Sang, 2019; Lu et al., 2020; Gaganis et al., 2013). It is anticipated that an increase in the ratio of customer deposits to total assets (DTA) will provide the commercial banks in Tanzania with the necessary resources to expand their business activities, thereby enhancing efficiency. Another factor considered is bank equity (EQTA), which is measured as the ratio of equity to total assets (Alhassan, 2015; Elyasian and Wang, 2012; Gaganis et al., 2013). This variable reflects the structure and capital strength of a bank's equity and is expected to have a positive relationship with bank efficiency. Furthermore, the study examines the impact of loans (LOTA) on bank efficiency, which is measured as the ratio of loans to total assets (Vidyarthi, 2019; Abdul, 2015; Gaganis et al., 2013; Elyasian and Wang, 2012). The research expects to find that an expansion in the scale of credit, without compromising the quality of credit, will lead to an improvement in bank efficiency. Additionally, the size of the bank (LNBS) is taken into account, which is measured as the natural logarithm of total assets (Alhassan, 2015; Lee & Kim, 2013; Gaganis et al., 2013; Elyasian and Wang, 2012). The study anticipates that an increase in the size of a bank will enable it to leverage economies of scale, thereby enhancing efficiency. Finally, the study considers the non-performing loan ratio (NPL/TA), which is measured as the ratio of non-performing loans to total assets (Luu et al., 2020).

3.6 Data Analysis

The data analysis involved a two-stage process. Initially, the efficiencies scores for Technical Efficiency (TE), Allocative Efficiency (AE), and Economic Efficiency (EE) were generated using the DEA methodology. Subsequently, the Tobit regression model analysis was conducted in the second stage of analysis. The DEA efficiencies scores were generated based on geographic diversification. The pooled data, which constituted the panel model, was then incorporated into STATA version 17. Additionally, descriptive, evolutionary, and multi-variety analysis techniques were employed.

3.6.1 Data Envelopment Analysis

The study utilized a non-parametric approach known as data envelopment analysis (DEA) to assess the technical, allocative, and cost efficiency of commercial banks in Tanzania from 2012 to 2020. The decision to employ DEA over the stochastic frontier analysis (SFA) technique was influenced by its simplicity (Alhassan,2016). Moreover, the efficiency scores obtained through DEA were based on individual observations of commercial banks, as opposed to the average tendencies derived from parametric approaches, which are susceptible to specification error. (Alhasan,2016). DEA was employed to estimate efficiency under both constant return to scale (CRS) and variable return to scale (VRS) assumptions. In the case of CRS, the frontier would be linear, while for VRS, the frontier would be convex (Luzzi and Webber, 2006; McKillop et al., 2002). Once the data envelopment surface was established, it served as a benchmark for measuring the relative efficiency or inefficiency of all other firms outside the envelopment surface. The most efficient firm in the sample was assigned a score of 1, while less efficient firms were allocated scores below 1. In this study, output-oriented DEA techniques were employed under the assumption of VRS to estimate efficiency, as it was deemed more suitable for practical scenarios. The study estimated technical efficiency (TE), allocative efficiency (AE), and economic efficiency (EF).

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$$\begin{aligned} &\text{Min } \Theta, \\ &\emptyset, X \\ &\text{Subject to } -y_i - Y_\lambda \geq 0 \\ &\qquad \emptyset x_i - X_\lambda \geq 0 \\ &\qquad \lambda \geq 0 \end{aligned} \quad \text{.....3.2)}$$

where Θ is the efficiency score of ith bank; y is the column vector of outputs, Y is m*n output matrix; x is the column vector of inputs and X is sxn input matrix for all DMUS or commercial banks and ƛ is n X I vector constants or vector of weighted coefficients. Followings Coelli et al. (2005), the study used the minimization approach due to its mathematical tractability.

The value of Θ computed is the efficiency score for the corresponding DMUs or Commercial Banks. It ranges from 0 to 1 with the value of the 1 indicating a point of efficiency frontier and hence technically efficiency DMU. All efficiency Commercial Banks was connected by a continuous focus to form efficiency frontier.

3.6.2 Specification of Input and Outputs

The consideration of input and output specifications in efficiency modeling holds significant importance. Within the banking literature, three primary approaches exist that prove useful in safeguarding the specification of inputs and outputs. These approaches include production, intermediation, and assets-based methods. Under the production approach, financial institutions are viewed as producers of deposits and loans. In this context, the number of employees and capital expenditure assume crucial roles. The second approach perceives financial institutions as intermediaries responsible for transferring financial assets from surplus units (savers) to deficit units (investors). Inputs in this approach encompass labor, capital costs, and interest payable in deposits, while loans and financial investments are considered as outputs. Lastly, the assets approach assumes that the fundamental function of any financial institution is the creation of loans, with the value of assets acting as the output. Given that the intermediation approach aligns closely with the main objective of this study, which is to maximize outputs based on input levels, the study

has adopted the intermediation approach in selecting inputs and outputs. Consequently, the inputs have been defined as total deposits, labor costs, and capital, while the outputs consist of loans and investments. These variables were chosen due to their ease of availability.

3.7 Models and estimation methods

To examine the individual effect of geographic diversification and the moderating effect of board composition measured in terms of independent directors on geographic diversification – commercial bank efficiency relationship, the current study uses random effect regression model. Moreover, to appropriately address the endogeneity or casualty problem caused by simultaneously relationship, this study also adopts random effect regression. For coefficient estimation, when using panel data, the fixed effect or random effect method should be used as the pooled OLS estimation might be biased and inconsistent because of omitted variables caused by un observable firm specific heterogeneity (Wooldridge, 2002). To decide whether to use the fixed effect method or random effect method, this study conducted the Hausman test. As the difference between two methods for coefficients estimation were insignificant the random effect method was adopted.

Moreover, because the casualty or endogeneity issue may exist in the relationship between geographic diversification and bank efficiency random effect model is also used. That is while we assume that geographic diversification significantly affects commercial bank efficiency in this study a reverse direction is also probable. Thus, biased and inconsistent estimations may engender because of these kinds of causality problem and endogeneity issues.

Effects of geographic diversification on efficiency was tested

$$TE = B_0 + B_1GD_{it} + B_2CD_{it} + B_3EQTA_{it} + B_4LOTA_{it} + B_5BS_{it}B_6NPTL_{it} + eit \ldots\ldots\ldots\ldots\ldots \quad (3.3)$$

$$AE = B_0 + B_1GD_{it} + B_2CD_{it} + B_3EQTA_{it} + B_4LOTA_{it} + B_5BS_{it} + B_6NPTL_{itt} + eit \ldots\ldots\ldots\ldots \quad (3.4)$$

$$EE = B_0 + B_1GD_{it} + B_2CD_{it} + B_3EQTA_{it} + B_4LOTA_{it} + B_5BS_{it} + B_6NPTL_{itt} + eit \ldots\ldots\ldots\ldots \quad (3.5)$$

Moderating role of board composition on relationship between geographic diversification and efficiency was tested.

$$TE = B_0 + B_1GDIV_{it} + B_2CD_{it} + B_3EQTA_{it} + B_4LOTA_{it} + B_5BS_{it} + B_6NPTL_{itt} + B_7BC_{it} + eit \ldots\ldots \quad (.3.6)$$

$$AE = B_0 + B_1GDIV_{it} + B_2CD_{it} + B_3EQTA_{it} + B_4LOTA_{it} + B_5BS_{it} + B_6NPTL_{itt} + B_7BC_{it} + eit \quad (3.7)$$

$$EE = B_0 + B_1GDIV_{it} + B_2CD_{it} + B_3EQTA_{it} + B_4LOTA_{it} + B_5BS_{it} + B_6NPTL_{itt} + B_7BC_{it} + eit \ldots\ldots \quad (..3.9)$$

4. RESULTS

4.1 Descriptive statistics

The analysis was based on these ratio and indices and the followings were the results presented in table 4.1. The mean technical efficiency (TE) for the sample was 83%, allocative efficiency (AE) was at a mean of 22% while economic efficiency (EF) was 19%. This implies that Commercial Bank in Tanzania operates 17%, 78% and 81% below the technical, allocative and economic efficiency fronter respectively.

Geographic diversification (GD) had means that were high i.e 0.32, 0.25 respectively. indicating that on average the commercial banks in Tanzania were highly diversified into geographic

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diversification.

Total Deposits (DPTA) forms a significant portion of assets base of commercial banks in Tanzania. The means of total Deposits is 0.7363 and its minimum is 0.4553 and maximum is 0.89. Equity (EQTA) of the Commercial Banks has a mean of 0.1476, its minimum is 0.078 and maximum is 0.3146. Loan (LOTA) tends to form an important portion of the total asset of Commercial Banks in Tanzania with a mean of 0.5666 and a minimum of 0.1206 and a maximum of 0.7549.The Commercial Banks have relatively larger assets base(LNBS) with a mean of 48.40, minimum of 24.66 and maximum of Non-performing loan(NPTL) has mean of 0.0851, minimum of 0.0047 and maximum of 0.4760.

Table 1: Descriptive analysis

	Count	Mean	Stad Div	Min	Max
TE	135	0.8309	0.1392	0.5413	1
AE	135	0.2152	0.2927	0.0067	1
EF	135	0.1939	0.2821	00607	1
GID	135	0.2465	0.1999	0.0112	1
DPTA	135	0.7363	0.090	0.4553	0.89
EQTA	135	0.1476	0.0389	0.078	0.3146
LOTA	135	0.5666	0.1096	0.1206	0.7549
LNBS	135	48.40	250.04	24.66	0.932
NPTL	135	0.0851	0.0814	0.0047	0.476
BIOM	135	0.9556	0.6174	0.67	8

Descriptive statistics of inputs and outputs

Table 2: Descriptive statistics of input and output

Variable	N	SD	Mean	Min	Max	Skewness	Kurtosis	p25	Median	p75
Output Variable										
LOAN	135	935.83636	624.838326	26.37	4108.79	2.244863	6.950579	102.95	256.12	592.26
INVET	135	225.62569	141.241037	5.15	983.93	2.359483	7.332179	29.21	53.4	117.77
Inputs variable										
TDEP	135	1310.5292	841.424170	29.833	5434.65	2.234901	6.799946	133.43	322.2	786.89
LCOS	135	58.114227	34.449489	1.1	337.43	2.923577	11.751292	8.45	14.52	21.52
FASS	134	81.873297	46.423731	.94	391.42	2.633671	9.173015	7.1	14.5	37.12
Price of inputs										
TDEPP	135	.020933	0.046393	.01	.126	.960356	3.887298	.03	.043	.056
LCOSP	135	.024485	0.038757	.0054	.1191	1.334217	4.245706	.022	.03	.046
FASSP	134	.080666	0.172888	.065	.579	1.940646	8.727385	.12	.15	.201

Source: Data Analysis (2022)

4.2 Correlation analysis.

Table 4.6 depicts the correlation matrix. In the context of independent and dependent variables, the matric shows that coefficient of geographic diversification is negatively correlated with all

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three parameters of efficiency (TE, AE, EF). However the results are only significant to allocative and economic efficiency and no significant relationship with technical efficiency. Moderating role of Board composition is positively related to technical efficiency, allocative efficiency and economic efficiency. However, the results are significant at allocative and economic efficiency.

Total deposits measured as the ratio of total deposits to total assets (DPTA) is positively related technical efficiency, allocative efficiencies. However, the results are not significant. Equity is positively related to technical efficiency and negatively related to allocative and economic efficiency. The result are significant at technical efficiency. Loan at linear term is negatively related allocative and economic efficiency. The results are significant at technical efficiency. Loan at quadratic term is negatively related to technical, allocative and economic efficiency. The results are significant of technical efficiency. Bank size is positively related to technical, allocative and economic efficiency. The results are significant at allocative and economic efficiency. Non-performing loan measured as the ratio of non-performing loan to total loans is insignificant related to technical, allocative and economic efficiency, linear terms of income diversification d the results are insignificant.

The correlation among the independent variable presented in Table 4. 4. revealed that in general correlation between variables are low. The highest coefficient (-0.47) is between geographic diversification (GD) and allocative efficiency. The second highest score (-0;46)) is between geographic diversification and economic efficiency. Overall, there appear not to be the presence of multicollinearity among.

Table 3: Correlation analysis

Variables	(TE)	(AE)	(EF)	(GDIV2)	(BCOMP)	(DPTA)	(EQTA)	(LOTA)	(LOTA2)	(LNBS)	(NPLTL)
TE	1.0000										
AE	0.37***	1.0000									
EF	0.42***	1.00***	1.0000								
IDIV	0.0100.	0.34***	0.32***								
IDIV2	0.0400	0.47***	0.31***								
GDIV2	-0.0700	0.47***	0.46***	1.0000							
BCOMP	0.0500	0.25***	0.26***	-0.1300	1.0000						
DPTA	0.0100	0.1100	0.1100	-0.0100	0.0300	1.0000					
EQTA	0.38***	-0.1200	-0.0900	0.20**	-0.0600	0.46***	1.0000				
LOTA	-0.19**	0.0300	0.0200	-0.14*	0.0700	0.0700	-0.41***	1.0000			
LOTA2	-0.15*	-0.0100	-0.0200	-0.1000	0.0600	0.0700	-0.38***	0.98***	1.0000		
LNBS	0.0800	0.24***	0.24***	-0.1000	0.99***	0.0500	-0.0500	0.0300	0.0200	1.0000	
NPLTL	-0.0600	-0.0800	-0.0900	-0.0500	0.0100	0.33***	0.0800	0.0100	0.0100	0.0000	1.0000

4.3 Main analysis and hypothesis testing

Table 4.5 presents examination of the effects of geographic diversification on commercial banks efficiency and the moderating effects of board composition in terms of independent directors on the geographic diversification -commercial banks efficiency. This study adopts random effect variable estimation to address the endogeneity problem that may obscure the casualty of the impact of geographic diversification on efficiency.

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In line with expectation the coefficients of geographic diversification (GD) have a negative relationship with all form of efficiency including technical, allocative and economic efficiency but the results are only significant with allocative and economic efficiency at 10%.(Table 4.7) .Thus, the findings of this study revealed that the effect of geographic diversification was negatively significant to allocative and economic efficiency implied that hypothesis two(H2) was well supported. The direction of geographic diversification is consistent with Transaction Cost Theory (TCT), because the commercial banks of Tanzania expanded its business activities into multiple market which involved complicated factors including natural environment and regulation. To deal with those complexities, internal transaction costs e.g coordination and information costs increases which lead to a negative influence on a commercial bank efficiency.
Findings indicated that board composition measured (BCOMP) in terms of independent outside directors positively moderating the relationship between geographic diversification and all form of efficiency. However, the results are only significant positive with technical efficiency at 10%. (Table 4.7) This is consistent with agency cost theory, implies that board composition contains independent outside director who have skill, knowledge and experience to enhance efficiency in Commercial banks. Therefore, hypothesis five is supported.

In regard to control variables, Total deposit (DPTA) was found to be negatively related to technical, allocative and economic efficiency. However, the results are significant negative to allocative and economic efficiency at 5%. (Table 4.5).Theoretically, this is explained by two circumstances :-Firstly if commercial banks have a maintenance of a too large number of customers deposits ,it creates pressure on interest for depositors ,increase costs and then total deposits would be negatively related to efficiency .But a on the other hand if commercial banks are capable of maintaining total deposits which is too low ,then they will have a trouble in building a source of capital to conduct profit ability operation to improve efficiency. Hence, total deposits in commercial banks of Tanzania lead to reduce technical, allocative and economic efficiency.

Bank equity (EQTA) coefficient exhibited a positive significant relationship with all forms of efficiency including technical, allocative and economic efficiency. However, the results indicated that technical efficiency is significant positive at 1% , allocative is positive significant at 5%, economic efficiency is significant positive at 10%.(Table 4.5). This indicates that, commercial banks of Tanzania with high equity capital are more technical, allocative and economic frontier. Thus, commercial banks of Tanzania become more technical, allocative and economic frontier with increase in equity to assets ratio. This is explained by important role of bank equity which has available adequate resources to ensures the safety of banking activities and thus capable to implement investment operations to generate profits. Hence, highly capitalized banks are more likely to operate on efficiency frontier.

Regarding loan (LOTA), the results show a negative relationship on technical, allocative and economic efficiency, however the results are significant on technical efficiency at 5% and insignificant at allocative and economic efficiency. On a squared terms of loan (LOTA) the results show a positive relationship on technical, allocative and economic efficiency, however the results are significant on technical efficiency at 1% and insignificant at allocative and economic

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efficiency. (Table 4.5). The interaction of linear and squared terms of loan (LOTA) results suggests a curvilinear or an inverted U tube relationship on technical efficiency and insignificant on allocative and economic efficiency. This indicate that, the commercial banks with high intermediation activities and efficiency use of resources are more technical efficiency. However, it reached a point LOTA is negative and significant related to technical efficiency implying that increased intermediation activities lead to reduced technical efficiency.

Results indicate that bank size (LNBS) coefficients exhibit a positive relationship with all forms of efficiency including technical, allocative and economic efficiency, however the results are significant on allocative and economic efficiency at 1% and insignificant at technical efficiency. (Table 4.5) Bank size as a variable has mixed results; positive sign supported the position that large commercial banks have economies of scale and scope advantages associated with its operations. On the other hands a negative relationship can be supported based on the fact that smaller commercial banks do not have economies of scale and scope advantage on its operations. Thus, larger commercial banks in Tanzania are more efficient in term of technical, allocative and economic because of economies of scale and scope advantages.

Findings observed that non-performing loan (NPL) coefficient are negatively related to all forms of efficiency including technical, allocative and economic efficiency, however, the results are significant positive and economic efficiency. (Table 4.5). This implies that allocative and economic efficiency are not efficiency enhancing of Commercial Banks. However, it reduces assets quality and quickly increase bank risk.

Table 4.5: Random effects estimations of income, geographic diversification, board composition on bank efficiency

\	(1)	(3)	(5)	(6)
VARIABLES	TE	AE	EF	/
IDV2	0.997	0.459	0.542	
	(0.884)	(0.605)	(0.610)	
DPTA	-0.127	-0.220**	-0.246**	
	(0.138)	(0.095)	(0.096)	
EQTA	1.075***	0.369*	0.462**	
	(0.304)	(0.208)	(0.210)	
LOTA	-0.940**	-0.293	-0.290	
	(0.386)	(0.264)	(0.266)	
LOTA2	1.079***	0.421	0.432	
		(0.268)	(0.271)	
LNBS	1.084	0.468***	0.474***	
	(0.320)	(0.225)	(0.228)	
NPLTL	-0.006	-0.134*	-0.134*	
	(0.113)	(0.077)	(0.078)	
	(1.585)	(1.085)	(1.095)	

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	(3.975)	(2.721)	(2.745)
BCOMP	-1.359	-0.336	-0.530
	(0.849)	(0.581)	(0.586)
	(2.110)	(1.444)	(1.457)
	(1.718)	(1.176)	(1.186)
	(4.359)	(2.983)	(3.010)
Observations	135	135	135
Number of BANK	15	15	15
chi2	389.2	4813	4392

5. DISCUSSION AND CONCLUSION

5.1 Conclusion

The main purpose of the current study is to examine the geographic diversification-commercial bank efficiency relationship in Tanzania banking industry in corporate governance context using board composition in terms of independent director as a moderator. Possible explanations exist regarding the significant negative impact of geographic expansion on commercial bank allocative and economic efficiency. As commercial banks expands business activities into multiple markets they became more complex being involved in complicated factors including regulations, environment competitive, and demand (Song & Kang,2020). To deal with those complexities internal transaction costs such as coordination , administrative increase and outweigh associated benefits of geographic diversification including economies of scale, scope and market power, which lead to negative influence on bank allocative and economic efficiency.(Kang,2014).This implies that geographic diversification is not improving technical, allocative and economic efficiency of commercial banks in Tanzania. Thus for every one unit increase in geographic diversification, we expect 2.017 and 2.007 decrease in allocative and economic efficiency respectively. The findings are in line with other previous literature, Goertz et al., (2014), Jouida et al. (2017). However, in this study findings indicates a positive and significant moderating impact of board composition in terms of independent director which implies that the influence of geographic diversification on allocative and economic efficiency to be greater in board composition in terms of independent directors than board composition in non-independent directors. Specifically board composition in terms of independent directors have extensive skills, knowledge, experience which lead to maximize allocative and economic efficiency among geographic diversification of commercial banks industry. In addition commercial banks which attempts to expand into strategically valuable location under board composition in terms of independent directors can benefit from favorable anti- competitive business environments. That is board composition capabilities generated by extensive knowledge, skills and experience can accelerate communication and cooperation among commercial banks in different geographic location and maximize allocative and economic efficiency.

5.2 Theoretical implication

The present study aims to investigate a topic that has received limited attention in the banking industry, specifically focusing on the moderating influence of board composition, particularly independent directors, on the relationship between geographic expansion and bank efficiency. By

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doing so, we anticipate making a valuable contribution to the field of banking literature by introducing a novel perspective that emphasizes the significance of board composition, particularly the adoption of independent directors, as a fundamental aspect of corporate governance. Moreover, as geographic diversification represents a key corporate-level strategy that is influenced by the composition of the board in terms of independent directors, this study enhances diversification theory by providing empirical proof that independent directors play a crucial role as an intervening variable that must be taken into account for a comprehensive analysis of the relationship between geographic diversification and commercial bank efficiency.

The results of the study indicate a negative and significant impact of geographic diversification on allocative and economic efficiency. This finding aligns with the Transaction Cost Theory, suggesting that the internal transaction costs associated with geographic diversification such as coordinating costs, administrative costs and information costs outweigh the benefits, such as economies of scale, economies of scope, market power advantage, and risk reduction (Kang, 2014). This, results is consistent with previous empirical findings .On the other hand, the positive moderating effect of board composition, particularly in terms of independent directors on allocative and economic efficiency supports the Agency Cost Theory, arguing that independent directors, compared to board composition non – independent directors, enables commercial banks to more properly alleviate costs and enlarge benefits from geographic diversification That is, while maximizing allocative and economic efficiency ,board composition in terms of independent directors in the commercial banking industry can effectively reduce the coordination ,administration, and information processing costs associated with geographic diversification ,since independent directors have skills, experiences and extensive knowledge .Overall ,this study clarifies and add values to relevant theories underpinning geographic diversification and independent directors by providing empirical evidences of the interaction effect between geographic diversification and board composition in terms of independent directors.

5.3 Practical Implication

The study findings revealed that the moderating role of board composition in terms of independent directors is positive significant to geographic diversification -allocative and economic efficiency relationship. Thus, utilizing these findings of the study, potential investors and analysts engaging in banking industry may consider board composition measured in terms of independent directors as a critical factor in scrutinizing investment portfolio as well as evaluation criteria. That is when investors or analyst attempt to conceive an investment portfolio incorporating commercial banks that actively implement geographic diversification in relation to efficiency the adoption of board composition in terms of independent directors can be one of the core components and basis in assessing the value of commercial banks and in turn making decision on which commercial banks they include in their portfolio.

Second, the study observed that geographic diversification -efficiency relationship is negative and significant related to allocative and economic efficiency. Thus, geographic diversification is not efficiency The findings of this study provide useful insight and recommendations for the managements and regulatory authorities in Tanzania context to place an emphasis in improving technical, allocative and economic efficiency. This will inform strategic decision on the best model to maximize the potential benefits of geographic diversification in regards to technical, allocative

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and economic efficiency in commercial banks of Tanzania context.

5.4 Limitation of the study

This study had various limitations which could be a good starting point for further research area in which the study was not able to cover due to limitation of time resources and they were out of scope of this study but, these are the areas that emanated from our research study process. The five possible limitations that this study faced are summarized hereunder. Firstly, the study used DEA to analyze the effect of income diversification, geographic diversification and its interaction on efficiency of commercial banks in Tanzania moderated by board composition measured in term of independent directors. The study suggest that future studies efficiency analysis can be further supplemented using parametric SFA, instead of DEA as in our study to see if similar results will be obtained.

Secondly, in spite of generalization of the findings of the research discovered the positive significant effect of moderated role of board composition measured in term of independent directors to technical efficiency and insignificant to allocative and economic efficiency. The study recommends that more studies to be conducted employing moderating role of board composition measured in term of independent directors in different context using different methodology to see if similar results will be obtained.

Thirdly, the study used board composition measured in term of independent directors to moderate the relationship between individual effect and its interaction of income and geographic diversification on efficiency of commercial banks. Future research needs to incorporate other corporate governance as moderating variable like interactive of board composition variable example board size, independent directors, CEO-duality to identify if the study yield different findings over a period.

Fourth, geographic diversification -efficiency relationship in commercial banks was predicted in this study using Transaction Cost Theory, Resource View and Agency Cost Theory as a theoretical framework. Future studies can consider other theories for predicting efficiency.

The fifth limitation is that the study spans from 2012 to 2020 with a country-specific dataset. From an econometric perspective, this may be deemed small. We recommend future studies consider bridging the gap in the dataset by expanding the scope of the current analysis as the income diversification, geographic diversification and its interaction on the efficiency of commercial banks in Tanzania measured in terms of moderating variable data availability improves.

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