Corporate Governance and Efficiency of Rural and Community Banks (RCBs) in Ghana

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ABSTRACT: Corporate governance crises that occur in the banking sector normally cripple economies and bring many hardships to individuals, corporate entities, communities, and the nation at large. In this study, we sought to examine the level of technical efficiency and productivity growth of rural and community banks (RCBs) and the impact of corporate governance indicators on the RCBs' efficiency performance in Ghana. A sample of 70 out of 140 RCBs was selected based on the ARB Apex Bank's performance ratings and data availability. Data envelopment analysis (DEA) was used to determine the technical efficiency scores of the selected RCBs. In the second stage of the analysis, these computed efficiency scores were regressed on the corporate governance variables to assess the effects of the latter. The findings from the DEA approach show that 11% to 20% of the sampled RCBs in Ghana operate close to the efficiency frontier, whereas the majority–about 65% to 81%-underperformed within the study period of 2007 to 2013. The study further established that the number of board members, frequency of board meetings, and corporate social responsibility have significant influence on RCB efficiency.

JEL classification: C14, D24, G21, G32, G34

Keywords: data envelopment analysis, technical efficiency, corporate governance, rural banks, Ghana

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Introduction

Good corporate governance is increasingly acknowledged as a significant driver of long-term investment and has become a crucial subject in financial circles. Such governance has become necessary for any organization serious about optimizing its performance. The literature on this subject also contains evidence of a positive correlation between the level of corporate governance and bank crises. Bank crises are argued to be a long-term result of a series of bad corporate decisions. Decisions critical for bank survival, including incentives, performance targets, provision of internal controls, and strategy, are all taken by the board of governors. As a result, corporate governance is seen as a vital key to understanding institutional efficiency and productivity. On the international front, cases such as Enron, WorldCom, Pacific Gas and Electricity Company, and Barings Bank are commonly cited. In Ghana, Atobease Rural Bank, DKB Finance, Merchant Bank, and Noble Dream Microfinance are commonly cited examples of the negative repercussions of weak corporate structures. In July 2018, the Bank of Ghana also cited corporate governance practices as the underlying factor for the collapse of seven commercial banks in Ghana between 2016 and 2018.

Adnan et al. (2011) indicate the need for strong corporate structures in the banking sector. A number of studies have thus attempted to assess the effect of corporate governance on bank performance. Recent additions include Fidanoski et al. (2014), Ameer et al. (2010), Tahir (2015), Poudel (2013), and Rao and Desta (2016). A common observation made from these extant studies is that banks rely too much on accounting indices to evaluate corporate performance. However, accounting indices are always single-factor input or output measures of performance and may be considered as "just scratching the surface" It is particularly useful to measure performance from multiple activities because financial institutions combine multiple inputs to produce different financial outputs.

Meanwhile, since the inception of rural banking in Ghana, concerns about limited capacity and liquidation threats, amidst fierce competition from the commercial banks, remain rife. Several rural and community banks (RCBs) have been closed down by the Bank of Ghana due to financial difficulties. In 2012 alone, 15 RCBs were classified as distressed, and 19 others were identified as mediocre banks. A 2012 Bank of Ghana report indicates that a total of 23 distressed RCBs have been shut down by the central bank since 2007 (Oteng-Abayie, 2017). These developments suggest a strong link between corporate governance and RCB performance. Despite the recent interest in corporate governance, studies of its effects on rural banking performance remain few. To the best of our knowledge, the deficit is even larger when the Ghanaian context is considered. Empirical research on the subject is largely non-existent, with the exception of Bokpin (2013) for commercial banks and other studies that focused only on rural bank efficiency and productivity (see Adusei, 2016; Oteng-Abayie, 2017).

The purpose of this paper is to examine the effects of several attributes of corporate governance, in particular, size of the board of directors and audit committee, frequency of board meetings, and corporate social responsibility, on the efficiency of RCBs in Ghana. We first estimate the technical efficiency levels and then examine the effects of corporate governance indicators on the efficiency performance of RCBs in Ghana. We employ the data envelopment analysis (DEA) approach to measure bank performance. The significance of using the DEA approach is that it allows for the assessment of bank performance using an array of output and input variables, unlike the one index performance measure that mostly characterizes the extant bank governance literature. Therefore, we can capture the real effect of corporate governance on the efficiency performance of RCBs. This study focuses on a unique dataset retrieved from the financial accounts of RCBs in Ghana from 2007-2013. Our findings from the DEA approach show that 11% to 20% of the sampled RCBs operate close to frontier efficiency, whereas the majority-about 65% to 81%-underperformed within the study period. The study established that the number of board members, frequency of board meetings, and the level of corporate social responsibility have significant influence on RCB efficiency.

The rest of this paper is organized as follows. Section 1 presents a brief literature review and the methodology is presented in the second section. Section 3 describes the data. Section 4 captures the data analysis and presentation of empirical results and the final section concludes and presents the practical implications of the study results.

1 Review of Related Literature

The evolution of thinking about corporation governance is traced to Berle and Means (1932) regarding the consequences of separating corporate control and ownership and then to Jensen and Meckling (1976) regarding agency theory. Corporate governance has been expressed as the processes and procedures through which firms are guided and controlled for effective decision-making (European Central Bank, 2004). Black et al. (2006) concluded that the way corporate governance is measured matters. Corporate governance in banks has been measured in diverse ways in the existing literature. For instance, whereas some studies use single indicators (Tanna et al., 2011; Laeven and Levine, 2009), others find it more convenient to use multiple indicators (such as board size, experience and independence of board members, and gender diversity, among others) to increase robustness of the measurement (Hartarska and Mersland, 2012; Romano et al., 2012; Huang, 2010). In this study, we use multiple indicators of corporate governance.

1.1 Corporate Governance and Efficiency of Banks

A plethora of studies exist that explore the effect of corporate governance on corporate performance (see Achim, 2016; Soba et al., 2016; Andrieş et al., 2018, for a summary of the empirical literature). The general consensus is that the effect of corporate governance on firm performance is mixed (Beisland et al., 2014). The effects are highly dependent on contextual factors as well as the measures of corporate governance and firm performance.

Gleaning from Andrieş et al. (2018) and Soba et al. (2016), studies focusing on the link between corporate governance and bank performance are growing in the literature. Earlier studies measured performance using traditional accounting-based ratios (e.g., pre-tax operating income, return on assets, market-to-book value, Tobin's Q, and the non-performing loans ratio) that are not multidimensional to studies that use robust frontier efficiency methods. Accounting-based indicators have, however, received large amounts of criticism. Therefore, with the availability of more robust mathematical programming and econometrics techniques, most recent studies have used frontier efficiency approaches to measure bank performance (Tanna et al., 2011). In Table 1, we present a summary of the empirical literature on the effects of corporate governance on bank performance. However, as shown in the table, studies that applied frontier efficiency methods are limited and their findings do not converge.

Performance measurement relying on frontier efficiency techniques such as the DEA is strongly recommended in the bank performance literature (Berger and Humphrey, 1997). The efficiency measures have several advantages over traditional indicators of performance. Efficient frontier approaches provide an overall objective numerical score and ranking, an efficiency proxy that complies with an economic optimization mechanism (Tanna et al., 2011). Also, the frontier efficiency approach simultaneously takes into account more than one input and one output of a firm, in contrast to accounting-based performance ratios (Thanassoulis et al., 1996).

Based on the reviewed empirical literature, we contribute to the existing studies by employing the frontier efficiency DEA technique to aid in determining the effect of corporate governance on bank performance. This will be the first study of its kind in the context of RCBs in Ghana.

2 Methodology

2.1 Efficiency Model

In order to investigate the empirical effect of corporate governance on the performance of RCBs, this study uses efficiency scores computed using the DEA model. The first part of the data analysis involves calculating the efficiency score of the ith RCB. DEA is a commonly

applied linear programming technique used for constructing a piece-wise frontier surface that can be used to evaluate the relative efficiency of identical decision-making units (DMUs) by capturing how each of them deviates from the idealized production output of the virtual DMU. DEA may adopt either Constant Returns to Scale (CRS), as first used by Charnes et al. (1978), or Variable Returns to Scale (VRS), later used by Banker et al. (1984). DEA, under the assumption of CRS or VRS, can be estimated by applying either the input-oriented or output-oriented approach.

In the input-oriented approach, efficiency is calculated as the proportional reduction in input usage given an observed level of output, whereas under the output orientation, efficiency is calculated as the proportional increase in output level given the observed input usage. For a detailed exposition of the DEA approach, see Murillo-Zamorano (2004).

In this paper, we employ the output-oriented DEA approach, motivated by the general observation that the RCBs have been put under a different categorization based on industrial ratings, which are performance-based. Thus, assuming that all the RCBs in the sample operate at an optimal scale would be incorrect. Moreover, we execute an output-oriented DEA approach based on the simple reason that the objective of RCBs in Ghana through the years has been to mobilize rural savings and capital. The RCBs are doing this by competing with peers, commercial banks, and other financial institutions in the financial market. Recent developments have resulted in most RCBs establishing new branches, collection points, and a variety of innovative products and programmes in a bid to compete in the market. Thus, we anticipate that increasing financial output is of primary importance to RCBs in Ghana.

The DEA efficiency score for the ith RCB is calculated by solving the following linear programming problem:

$$\begin{aligned} Max\,\theta \quad & subject\ to \\ -\theta q_i + \mathbf{Q}\lambda \quad & \geq \mathbf{0}, \\ x_i - \mathbf{X}\lambda \quad & \geq \mathbf{0}, \\ \mathbf{1}'\lambda \quad & = 1, \\ \lambda \quad & \geq \mathbf{0} \end{aligned} \tag{1}$$

where y_i is a vector of outputs, x_i is a vector of inputs, $\mathbf{1}$ is an $N \times 1$ vector of ones, and λ is a $N \times 1$ vector of constants. Computed θ lies between 0 and 1. This means that when the computed efficiency score is equal to 1, then the DMU is said to be efficient and is otherwise considered inefficient. The symbol λ is the weight assigned to a DMU. Hence, θ and λ are the so called dual variables.

2.2 Determinants of Efficiency

Subsequently, computed efficiency scores are used as dependent variables and regressed on the corporate governance variables. This study adopts the pooled OLS regression model, which follows the normal OLS estimator assumptions. The model is expressed as:

$$Z_{i,t} = \alpha + h_{i,t}\beta + e_{i,t}, \quad i = 1, 2, 3 \ldots N, \quad t = 1, 2 \ldots T \tag{2}$$

where $Z_{i,t}$ is the efficiency score of each RCB at time t, $h_{i,t}$ is the vector of corporate governance indices, β is a vector of parameters, α is the constant term, and $e_{i,t}$ is the random error term. The empirical estimable equation is expressed as:

$$\theta_{i,t} = \beta_0 + \beta_1 NBM_{i,t} + \beta_2 FBM_{i,t} + \beta_3 ACS_{i,t} + \beta_4 FACM_{i,t} + \beta_5 CSR_{i,t} + e_{i,t} \tag{3}$$

3 Data

The data for this study were extracted from audited annual reports of the RCBs for the period 2007-2013, kept by the ARB Apex Bank. Based on the available data, 70 out of 140 RCBs were used for the analysis. The ARB Apex Bank serves as a central bank and regulator for rural and community banks in Ghana. The ARB Apex Bank assesses the performance of RCBs in four major rating areas as strong, satisfactory, fair, marginal, or distressed based on their capital, assets (including asset quality and asset utilization), savings/profitability, and liquidity. The sample used comprises 10 strong, 35 satisfactory, 15 fair, and 10 marginal RCBs.

3.1 Input and Output Variable Specification

This study adopts the intermediation approach because RCBs in Ghana take savings from depositors and lend them out to prospective borrowers (Paxton, 2003). Deposits and operating expenses (including interest expenses) are treated as inputs, whereas interest income and loans are treated as outputs (see Soba et al., 2016). All the variables used in the model are measured in Ghanaian Cedis. The variable descriptions and expected signs are presented in Table 2 and the descriptive statistics of the input and output variables are in Table 3.

4 Empirical Results

4.1 Technical Efficiency Estimates

Efficiency scores of all the RCBs were determined through DEA analysis. The efficiency indices were measured based on the VRS and output orientation assumptions. Table 4 gives a frequency distribution of technical efficiency scores based on the VRS-DEA output-oriented approach. The technical efficiency scores do not differ much from the VRS input-oriented approach or from the scores generated with the CRS approach (see Figures 1, 2, 3 and 4). A visualization of the trends in overall average efficiency shows that the RCBs experienced a fall in technical efficiency from 2007 to 2011 and picked up from 2011 to 2013. The period of the decline may be attributed to the global financial crises when banks experienced financial difficulties and credit crunches. All the RCBs that obtained a computed efficiency score equal to unity are regarded as fully efficient, whereas all those with scores less than 1 are referred to as inefficient. From Table 4, we observed that the annual technical efficiencies for the individual RCBs ranged from a minimum of 11.20% to a maximum of 100%. Average annual technical efficiency scores for all 70 RCBs varied from 54.28% to 69.36%, suggesting that the sampled RCBs were generally technically inefficient during the sampled period. This is also reflected in the number of technically efficient RCBs. A closer look at the annual technical efficiency scores revealed that most of the sampled RCBs received efficiency scores of 51% to 90%. Figures 1 and 2 show the average technical efficiency during the study period for each RCB. Only three of the 70 RCBs sampled achieved full technical efficiency consistently during the study period. The CRS efficiency score, which is more flexible, returns about 10 fully efficient RCBs. The least efficient bank (RCB59) achieved an efficiency score of 18.3%.

4.2 Effect of Corporate Governance on Technical Efficiency

Table 5 reports the effects of the corporate governance variables on technical efficiency (TE) of the RCBs based on equation 3. Based on the model statistics, which show a minimal Root MSE (17.793), we focus on the constant returns TE (CRS) model for interpretations. The results show that the number of board members (NBM) has a positive and significant effect on efficiency, suggesting that a large board size is more technically efficient than a smaller one. Other studies that find a positive relationship between board size and bank efficiency include Soba et al. (2016), Bokpin (2013), Poudel (2013), and Tanna et al. (2011). Anderson and Campbell (2004) also found evidence to suggest that boards of larger size monitor managers to track a reduced cost of debt. Creditors are of the view that those firms have good and efficient monitoring systems to ensure strong accounting procedures for firm performance. However, this finding is inconsistent with Jensen's agency theory, which

suggests that smaller board size is beneficial for driving organizational outcomes (Jensen, 1993). Damme et al. (2016) report findings for microfinance institutions in support of the agency theory.

The frequency of board meetings (FBM) is significant at 10%, and reveals a positive influence on RCB efficiency. This is consistent with the view that boards which meet frequently may overcome the risk of information asymmetry and can address issues on time before they get out of control. Tai (2015) stated that, like board size, more frequent board meetings might lead to better firm effectiveness. Likewise, Ntim and Osei (2011) stated that there is an important and positive alliance among the performance of corporations and the series of board meetings. Moreover, experts have argued that increasing the frequency of board meetings will assist directors to keep abreast of the information on important developments happening in their firm, thereby placing them in a good position to solve budding problems quickly.

The study findings show corporate social responsibility (CSR) has a significant positive but muted influence on technical efficiency under the CRS assumption. This finding supports the view that good corporate citizenship enhances firm performance. CSR aims to hold corporations responsible for their actions and to promote a positive corporate effect on the environment and stakeholders, including consumers, employees, investors, communities, and others. Corporate governance and corporate social responsibility may reinforce each other in the search for a vision of the firm as an institution, which may create value while having regard for the welfare of stakeholders. This is in line with the observations made by Laan et al. (2008).

Audit committee size (ACS) and frequency of audit committee meetings (FACM) show no significant influence on RCB efficiency. This may be due to the lack or absence of standing audit committees in most of the RCBs in Ghana. This result is somewhat contrary to the findings of De Zoort et al. (2002), which suggest that larger audit committees tend to have better resources at their disposal than smaller ones. Klein (2002) and Kyereboah-Coleman (2008), however, revealed that there is a positive relationship between audit committee size and a firm's performance. The independent work of the audit committee has a great influence on the efficiency of the firm.

5 Conclusion

Issues regarding corporate governance are a global phenomenon and its crucial role in financial institutions must not be underestimated. Indeed, good corporate governance is a catalyst for ensuring good performance in the banking sector, in which the RCB industry is not exceptional. RCBs in Ghana have recently moved in the direction of adopting corporate

governance best practices in order to boost efficiency in their operations. This study was undertaken to uncover the extent to which corporate governance affects RCB performance in Ghana. We estimated the level of efficiency of 70 sampled RCBs using the DEA technique under different assumptions. Our findings suggest that most RCBs are technically inefficient and although some RCBs had attained full efficiency at some points in the sample period, the majority of them were unable to operate at an optimal technical efficiency. In the period 2007-2011, the sampled RCBs generally suffered an efficiency decline within the period of the global financial crisis. In terms of the effect of corporate governance variables, the study recognized that the board size, frequency of board meetings, and CSR are significant predictors of RCB efficiency. The implication is that managers of RCBs must encourage regular board meetings and also increase investment in corporate social responsibility to improve their performance.

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Figure 1: Average Technical Efficiency: VRS Output Oriented (2007-2013)

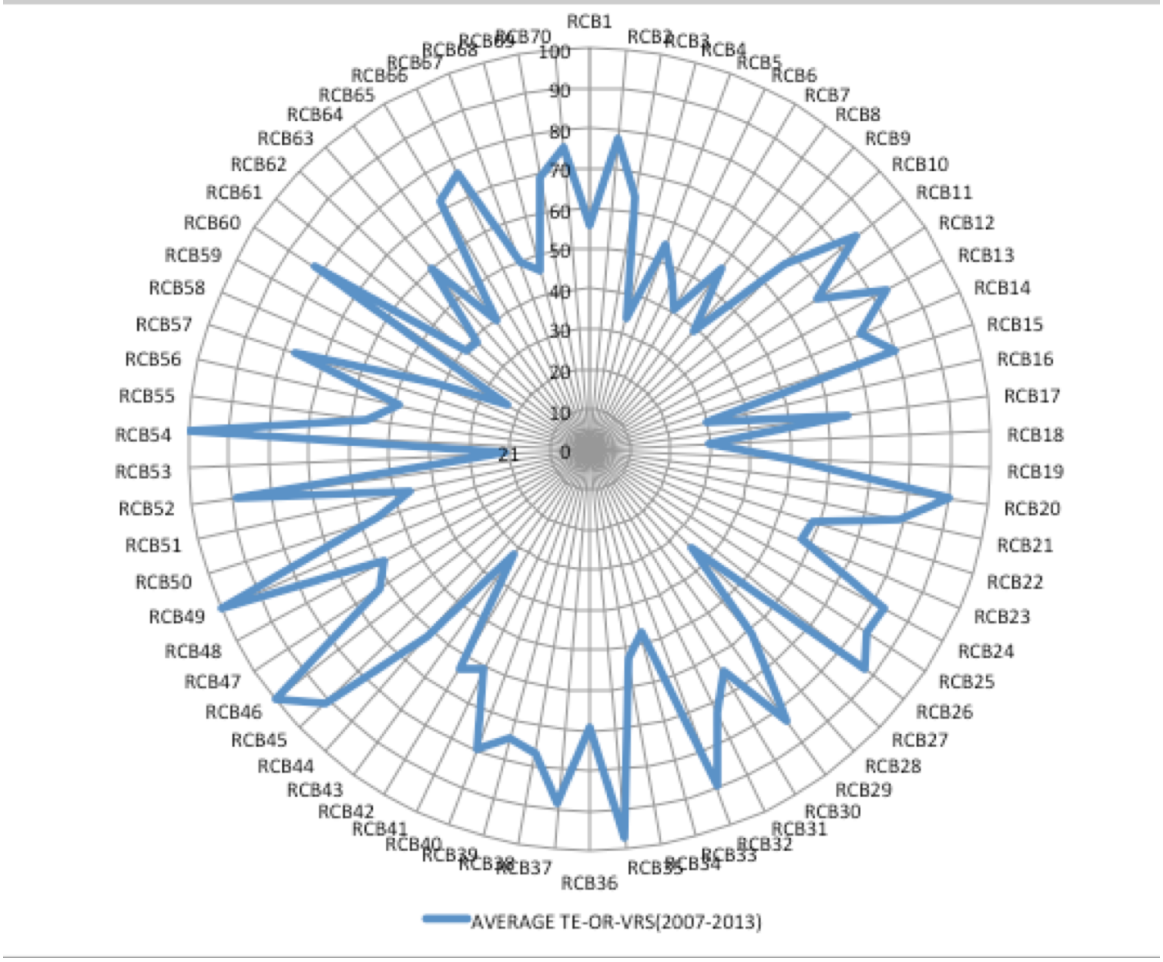

Figure 2: Average Technical Efficiency: VRS Input Oriented (2007-2013)

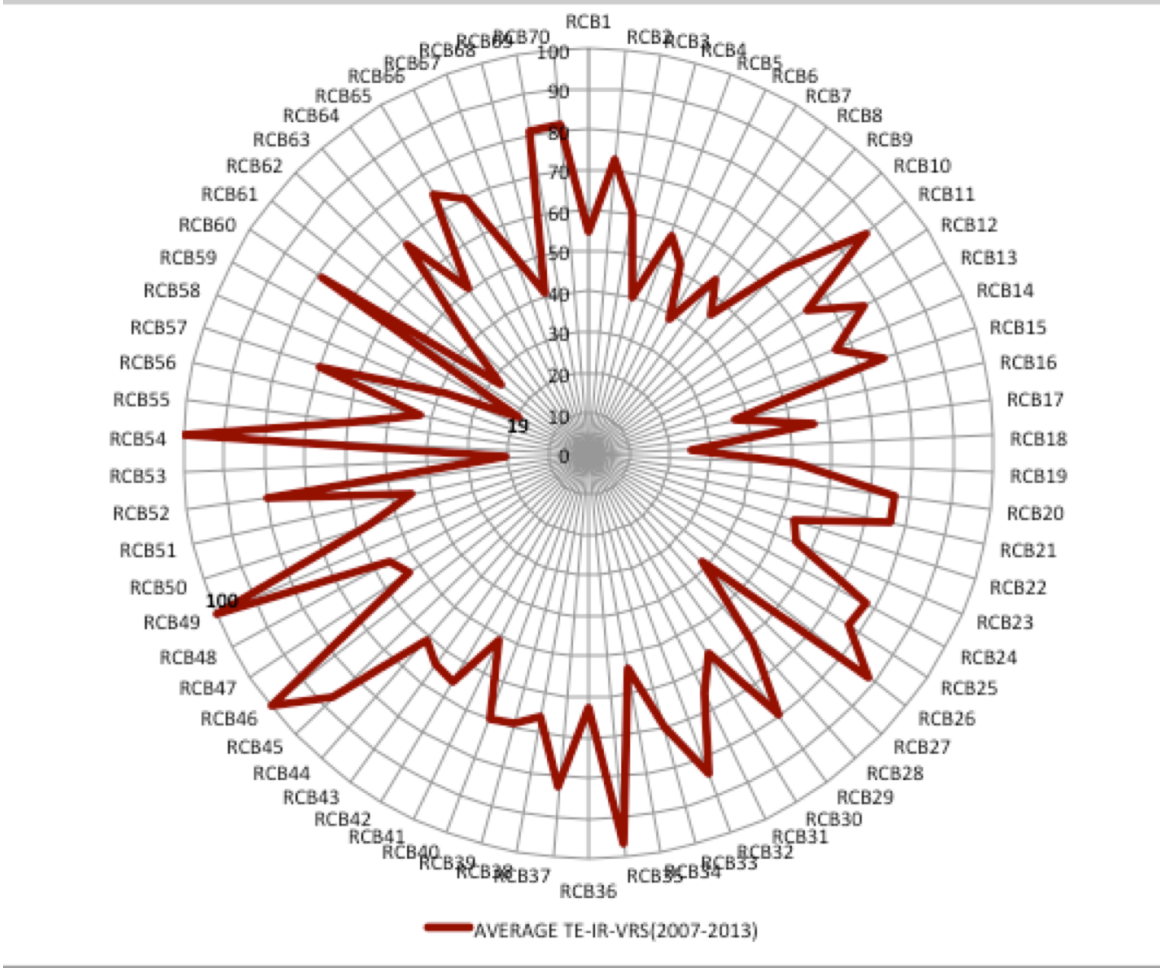

Figure 3: Average Technical Efficiency: CRS (2007-2013)

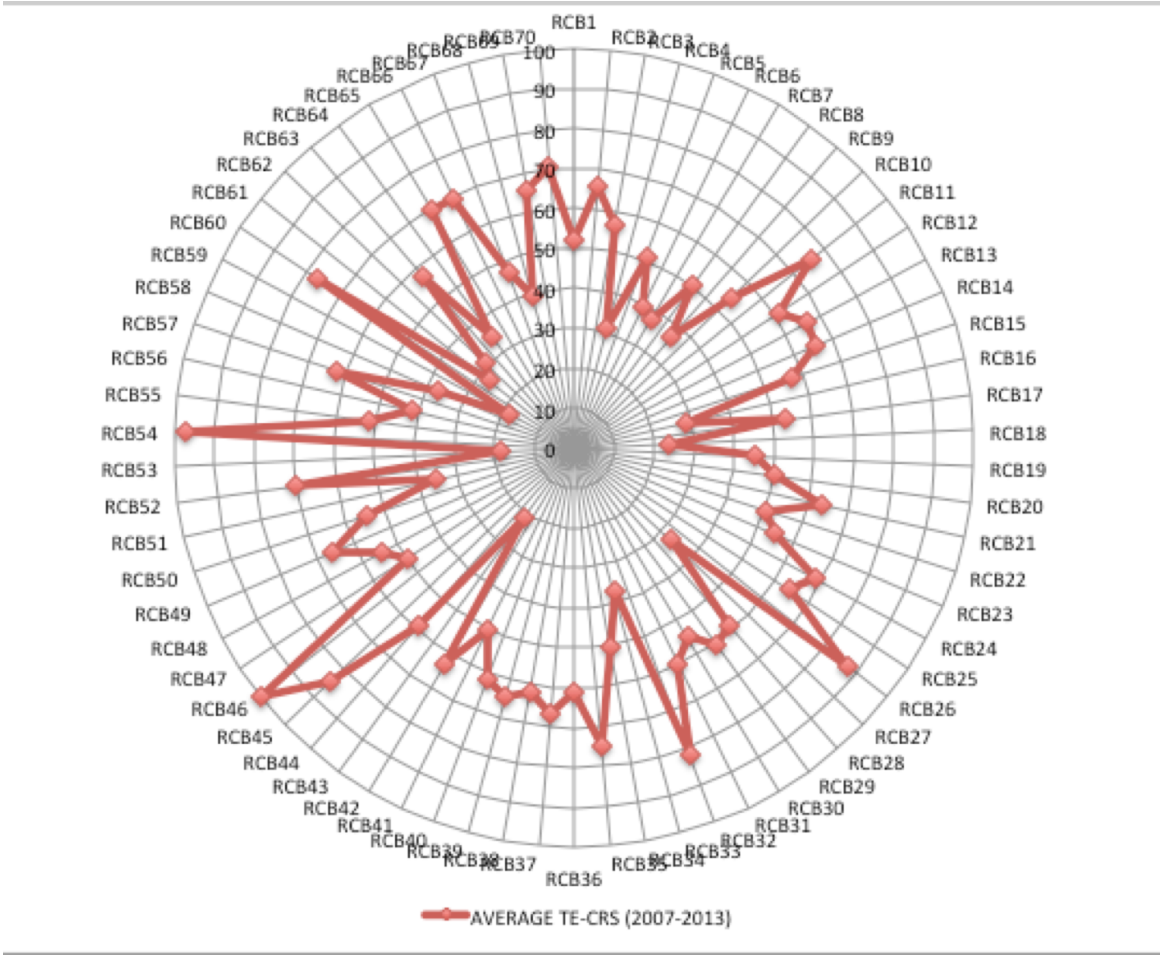

Figure 4: Trends in Overall Average Technical Efficiency (2007-2013)

Table 1: Summary of Empirical Literature on Corporate Governance and Bank Efficiency

Authors	Country and Period	Method	Bank Performance Indicator	Corporate Governance Indicators	Key Findings
Frontier efficiency studies					
Salim et al. (2016)	Australia (1999-2013)	Data Envelopment Analysis and Truncated Regression Analysis	Technical efficiency Inputs: - Interest expenses - Non-interest expenses Outputs: - Interest income - Non-interest income	- Board size - Board independence - Number of board meetings - Number of committee meetings - Ownership concentration	Positive relationship between technical efficiency and both board size and number of committee meetings
Soba et al. (2016)	Turkey (2005-2015) 10 Turkish depository banks listed in Borsa Istanbul (BIST)	Data Envelopment Analysis and Panel Regression Analysis	Technical efficiency Inputs: - Total deposits - Interest expenses - Personnel expenses Outputs: - Total loans - Interest income	- Board independence - Major shareholder - Number of committees - Board size	Board independence has a negative and significant impact on the efficiency of the banks. Major shareholder, number of committees, and board size has positive and significant relationship with bank efficiency.

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Table 1: Summary of Empirical Literature on Corporate Governance and Bank Efficiency (Continued)

Authors	Country and Period	Method	Bank Performance Indicator	Corporate Governance Indicators	Key Findings
Frontier efficiency studies					
Damme et al. (2016)	Sri Lanka (2011) 36 monetary financial institutions (MFIs)	Data Envelopment Analysis and Truncated Regression Analysis	Inputs: - Operating expenses - Total employees Outputs (Financial Model): - Gross loan portfolio Outputs (Outreach Model): - Women borrowers	- Board size - Number of women on the board - CEO/Chair duality - Presence of a woman CEO on the board	Results reveal that smaller and gender-diverse boards have a positive impact on financial efficiency. MFIs in which the chief executive officer (CEO) chairs the board and a woman holds the CEO position are less efficient in terms of poverty outreach.
Andrieş et al. (2018)	17 countries of Central and Eastern Europe (2005-2012) 139 commercial banks	Data Envelopment Analysis Method	- Cost efficiency - Technical efficiency	- Corporate governance index - Risk management index - Supervisory board index	Rigorous corporate governance structures are associated with higher costs for banks and a lower level of efficiency. Tight governance mechanisms significantly increase banks' cost and technical efficiencies.

Table 1: Summary of Empirical Literature on Corporate Governance and Bank Efficiency (Continued)

Authors	Country and Period	Method	Bank Performance Indicator	Corporate Governance Indicators	Key Findings
Frontier efficiency studies					
Bokpin (2013)	Ghana (1999-2007) 25 commercial banks	Stochastic Frontier Analysis and Panel Data Analysis	- Cost efficiency - Profit efficiency Inputs: - Labor input price - Finance input price - Physical input prices Outputs: - Loans and investments	- Ownership structure - Board size - Board independence - Inside ownership	Governance (a larger board size) strongly improves profit efficiency, but slightly worsens banks' cost efficiency.
Hartarska and Mersland (2012)	60 countries 278 MFIs	Stochastic Frontier Analysis	- Cost efficiency	- Board size - CEO duality - Number of independent executives on the board	The findings of the study showed that the size of the board has a non-linear effect on firms' cost efficiency. Furthermore, we observed that CEO duality and the number of independent executives on the board negatively affects the efficiency of firms.
Tanna et al. (2011)	England (2001-2006) 17 banks	Panel Regression Analysis	- Cost efficiency Inputs: - Fixed assets - Deposits and short-term funding - Personnel expenses Outputs: - Net loans - Other earning assets	- Board size - Board independence	Positive relationship with all corporate governance variables.

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Table 1: Summary of Empirical Literature on Corporate Governance and Bank Efficiency (Continued)

Authors	Country and Period	Method	Bank Performance Indicator	Corporate Governance Indicators	Key Findings
Accounting-based studies					
Al-Sahafi et al. (2015)	Saudi Arabia (2009-2012) 11 banks	Panel Regression Analysis	- Return on assets - Return on equity - Tobin's Q	- Board size - Board independence - CEO status - Audit committee - Ownership concentration	Positive relationship with board size and board independence. Negative relationship with ownership concentration.
Haider et al. (2015)	Pakistan (2008-2012)	Correlation and Linear Regression Analysis	- Return on assets - Return on equity - Earnings per share	- Board size - Number of meetings - Audit committee size	Positive relationship with all corporate governance variables
Arouri et al. (2014)	GCC countries (2010) 58 banks	Multivariate Regression Analysis	- Tobin's Q	- Family ownership - Institutional ownership - Foreign ownership - Government ownership - Board size - CEO duality	Positive relationship with family, institutional, and foreign ownership.
Al-Amarneh (2014)	Jordan (2000-2012) 13 banks	Panel Regression Analysis	- Return on assets - Operating efficiency ratio	- Ownership concentration - Institutional ownership - Foreign ownership - Board size - CEO duality	Positive relationship with board size and ownership concentration. Not significant with institutional and foreign ownership.

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Table 1: Summary of Empirical Literature on Corporate Governance and Bank Efficiency (Continued)

Authors	Country and Period	Method	Bank Performance Indicator	Corporate Governance Indicators	Key Findings
Accounting-based studies					
Poudel (2013)	Nepal (2005-2011) 29 banks	Panel Regression Analysis	- Non-performing loan/total loan	- Board size - Board independence - Number of board meetings - Audit committee size - Number of audit committee meetings - Institutional ownership - Foreign ownership	Positive relationship with board size, audit committee size, and board independence.
Akpan and Riman (2012)	Nigeria (2005-2008) 11 banks	Correlation and Regression Analysis	- Return on assets - Return on equity - Non-performing loans	- Board size - CEO duality - Number of shareholders	Positive relationship with all corporate governance variables.
Tomar and Bino (2012)	Jordan (1997-2006) 14 banks	Panel Regression Analysis	- Return on assets - Return on equity	- Ownership structure - Composition of board of directors - Managerial ownership - Outstanding shares owned by members of board of directors - Number of directors appointed by the shareholders on the board	Positive relationship with compositions of board of directors and institutional ownership. Negative relationship with institutional ownership.

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Table 1: Summary of Empirical Literature on Corporate Governance and Bank Efficiency (Continued)

Authors	Country and Period	Method	Bank Performance Indicator	Corporate Governance Indicators	Key Findings
Accounting-based studies					
Aygun et al. (2010)	Turkey (2006-2008) 12 banks	Correlation and Regression Analysis	- Return on assets - Tobin's Q	- Board size - Free float rate	Negative relationship between board size and return on assets. Positive relationship between Tobin's Q and return on assets. Positive relationship with free float rate.
Praptiningsih (2009)	Asian Emerging Markets (2003-2007) 52 banks	Panel Regression Analysis	- Return on assets	- Ownership concentration - Government ownership - Foreign ownership - CEO duality - Board size - Board Independence - Rating of banks by reputable ratings agencies (Big 3) - Auditing by reputable external auditor (Big 4)	Not significant relationship with board size, board independence, ownership concentration, and Big 3. Negative relationship with foreign ownership and CEO duality. Positive relationship with Big 4.
Staikouras et al. (2007)	Europe (2002-2004) 58 European banks	Panel Regression Analysis	- Return on assets - Tobin's Q	- Board size - Board Independence	Negative relationship with board size. Positive relationship with board independence.

Table 2: Summary of Variables Used in the Study

Variables	Description	Hypothesized signs
Performance variables		
Deposits	Used as an input variable and measured as the total savings deposits of members of a particular RCB	n/a
Expenses	Used as an input variable and defined as the total operating expenses, including interest expenses, of the RCB	n/a
Interest Income	Used as an output variable and defined as the total income due to interest payment on loans	n/a
Loans	Volume of loans granted to members in a particular year.	n/a
Corporate Governance variables		
NBM	Number of board members (board size)	+/-
FBM	Frequency of board meetings	+
ACS	Number of audit committee members (audit committee size)	+/-
FACM	Frequency of audit committee meetings	+/-
CSR	The level of corporate social responsibility	+

Table 3: Descriptive Statistics of Input and Output Variables

Variables	N	Mean	Std.Dev	Minimum	Maximum
Deposits	490	6,569,255	7,152,924	78767.37	5.13e+07
Interest Expenses	490	1,123,206	1.38e+07	7754.22	3.04e+08
Interest Income	490	2,242,833	2.17e+07	19968	4.78e+08
Loans and Advances	488	3,438,434	3,692,280	23907.3	2.55e+07

Table 4: Frequency Distribution of Mean Technical Efficiency Scores

Frequency	2007	2008	2009	2010	2011	2012	2013
<=30	4 (5.7%)	6 (8.57%)	8 (11.43%)	8 (11.43%)	15 (21.43%)	8 (11.43%)	6 (8.57%)
31-50	10 (14.29%)	9 (12.86%)	12 (17.14%)	14 (20%)	18 (25.71%)	15 (21.43%)	16 (22.86%)
51-70	19 (27.14%)	21 (30%)	16 (22.86%)	20 (28.57%)	19 (27.12%)	20 (28.57%)	22 (31.43%)
71-90	20 (28.57%)	19 (27.12%)	19 (27.12%)	19 (27.12%)	10 (14.29%)	19 (27.12%)	10 (27.12%)
91-99	2 (2.86%)	3 (4.29%)	2 (2.86%)	3 (4.29%)	1 (1.43%)	1 (1.43%)	4 (5.7%)
100.00	14 (20%)	11 (15.71%)	13 (18.57%)	5 (7.14%)	7 (10%)	7 (10%)	11 (15.71%)
Overall Stats							
Mean score	69.36	68.57	66.39	61.34	54.28	61.92	63.67
Standard dev.	22.85	23.84	25.41	24.74	25.85	23.07	24.65
Minimum score	16.10	12	13.80	12.70	11.20	19.90	19.90
Maximum score	100	100	100	100	100	100	100

Table 5: Effect of Corporate Governance on RCB Technical Efficiency (TE)

	Efficiency Models		
Variables	**TE (OR-VRS)**	**TE (IR-VRS)**	**TE (CRS)**
Constant	46.80***	46.42***	22.63
	(15.22)	(15.86)	(14.30)
NBM	4.613**	3.888*	6.008***
	(1.950)	(1.977)	(1.829)
FBM	0.685	0.433	1.212*
	(0.708)	(0.720)	(0.669)
FACM	-2.079	-0.905	-2.671
	(2.557)	(2.613)	(2.399)
ACS	0.157	0.123	0.179
	(0.559)	(0.571)	(0.55)
CSR	0.00009	0.0003	0.0004**
	(0.0002)	(0.0002)	(0.0002)
F(5,64)	1.44	1.31	3.88***
R-squared	0.1013	0.0929	0.2325
Root MSE	18.892	19.218	17.793