
Corporate Social Responsibility and Bank Cost Efficiency in Nigeria: Stochastic Frontier Analysis

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Abstract

This study examines the relationship between corporate social responsibility (CSR) and bank cost efficiency in Nigeria, utilizing Stochastic Frontier Analysis (SFA). The researchers adopted ex-post facto research design. The operating commercial banks in Nigeria as of December 31, 2021, totalling twenty-seven institutions form the population of the study. From this population, a sample of nineteen banks, both with international and national authorizations, is being selected through the use of a purposive sampling technique. Secondary data were used as the sources. The analysis employed a parametric mathematical optimization approach based on Stochastic Frontier Analysis. The analysis states a positive and significant impact of a CSR on bank cost efficiency. Consequently, the study recommends that banks should integrate CSR activities into their business strategies, as these initiatives can enhance the bank's performance, improve its image, reduce risks, and subsequently increase efficiency in their operation.

Keywords: CSR, profitability, efficiency, firm, financial performance.

1. Introduction

In today's global economy, banks are increasingly engaging in Corporate Social Responsibility (CSR). There is commonly understood of CSR as a means by which a firm achieves a balance across the Triple-Bottom-Line Approach - encompassing environmental, economic, and social imperatives - while also expecting to address the shareholders and stakeholders (Binh, Mulatu, & Xu, 2022). For banks, CSR extends beyond merely demonstrating a commitment to good deeds or addressing consumer skepticism. It encompasses both the individual responsibility of each institution to safeguard the funds entrusted to it and its responsibility of banking sector to ensure stability of financial system and the broader economy.

The impact of banks' CSR activities is far-reaching, affecting the well-being of their clients, employees, and the owners, but also influencing society at large. This influence is evident through the banks' role in the capital gathering and allocation, as well as the broader economic implications of the banking sector's financial soundness and stability.

Historically, the primary focus for organizations was profitability and wealth accumulation. However, modern business dynamics necessitate a more nuanced evaluation of performance, encompassing various dimensions of cost and its impact on overall performance (Adepoju & Mustapha, 2021). Efficiency is a critical measure of a bank's performance, defined as an optimal utilization of the limited resources which lead to achieve the maximum output with the minimal cost, efficiency refers to the effective and economical use of available resources. (Ullah, Majeed, & Popp, 2023). In the banking sector, cost efficiency refers to a bank's ability

to deliver services without resource wastage due to technical or allocative inefficiencies. An efficient banking system contributes significantly to societal welfare by offering innovative and high-quality services at the lowest possible cost. From an efficiency perspective, Corporate Social Responsibility (CSR) activities can impact a bank's inputs, improve the processing and utilization of these inputs, and consequently enhance the bank's overall efficiency and output. A bank is considered efficient if its output is maximizing from an input or minimizes the inputs required to achieve a desired level of output. Efficient banks effectively mobilize funds to support lending and borrowing processes and foster investment.

There is a lot of studies that conducted on the Corporate Social Responsibility (CSR) and financial performance relationship. Including those by Shabbir & Wisdom (2020), Ramzan Amin & Abbas (2021), Okafor, Adeleye & Adusei (2021), Yahaya & Lamido (2022), Botchwey, Sarpong & Marfo (2023), Rana (2018), Azumah (2020), Nguyen, Bui & Le (2022), Enughulu & Dabor (2018), Oyewumi, Ogunmeru & Oboh (2018), and Szegedi, Khan & Lentner (2020). These studies provide evidence of an impact of CSR on financial performance, reinforcing significance of mixing CSR with strategic banking practices. Despite considerable research, a consensus on the relationship between Corporate Social Responsibility (CSR) and financial performance remains elusive. Existing studies yield divergent conclusions, indicating potential positive, negative, or neutral correlations. These discrepancies are attributed to differences in economic conditions across countries, methodological approaches, and regulatory mechanisms employed in different studies.

Unlike previous research which measures financial performance primarily through accounting or market-based indicators, this study focuses on assessing bank cost efficiency. Although some few studies on bank efficiency in Nigeria, such as those by Nyong (2017), Ajayi, Nageri, Abogun, and Abdulmumin (2017), and Oke, Ogbuji, and Bokana (2017), which utilize non-parametric methods like Data Envelopment Analysis, there is a notable scarcity of research examining the interplay between CSR and bank cost efficiency in Nigeria. In contrast to these prior studies, Stochastic Frontier Analysis (SFA) parametric method was employed to explore the relationship of CSR and bank cost efficiency. By utilizing SFA, this study aims to provide a more nuanced understanding of how CSR impacts bank efficiency within the Nigerian context.

2. Literature Review

2.1 Concept of Efficiency

Efficiency is conceptualized from various perspectives in the literature. Adepoju and Mustapha (2021) define efficiency as the ratio of output to input. Similarly, Octrina and Mariam (2021) view efficiency as a comparative measure between the output produced and the input utilized. Fongtanakit (2023) also describes efficiency in terms of the output-to-input ratio, with a lower input-to-output ratio or a higher output-to-input ratio indicating higher efficiency.

Al-Tit (2016) defines efficiency as the capability of firms to produce at an optimal level, emphasizing the ability to use input resources minimally while achieving the highest level of productivity over time. Tijani (2022) describes efficiency as the successful allocation of input resources to maximize output. Bhatia and Mahendru (2018) refer to efficiency as the optimal allocation of resources to achieve the highest level of outputs. Cicea (2020) asserts that the ratio of inputs to outputs is a critical determinant in assessing whether efficiency conditions are met.

Ullah, Majeed, and Popp (2023) identify three types of efficiency: scale, price, and cost efficiency. This study focuses specifically on cost efficiency, which, according to Sardar, Azeem, and Hassan (2013), involves achieving minimum cost while maximizing output with limited resources.

Ullah, Majeed, and Popp (2023) document that cost efficiency in banking involves comparing a bank's costs to the best practices within an industry that produce an equal output under similar circumstances. Bank is considered as a good cost-efficient when utilizes its inputs at a very low possible cost while maximizing output within the same timeframe and conditions. This measure reflects how effectively a bank converts its resources into high-quality products and services while minimizing costs.

2.2 Concept of corporate social responsibility

Corporate Social Responsibility (CSR) is viewed from various perspectives in the literature. Jamali (2020) conceptualizes CSR as a modern movement from old generational value creation and profit maximization for shareholders to the more comprehensive approach that emphasizes value creation and the profit maximization to the stakeholders. Lusiana, Che Haat, Saputra, Yusliza, and Muhammad (2021) describe CSR as a form of corporate awareness aimed at enhancing relationships with the community and the environment. Awadzie, Garr, Attah-Botchwey, Sarpong, and Marfo (2023) define CSR as the concept of management that encourages businesses to integrate environmental and social factors for considerations into their daily operations and stakeholder interactions. Alhassan and Islam (2019) defined corporate social responsibility (CSR) as the process of achieving business success through practices that respect ethical values and honor communities, people, and the natural environment. Hsu and Chen (2023) described CSR as the manner in which businesses address their broader societal responsibilities by extending beyond economic considerations. Setiawati, Sekarningrum, and Witono (2023) characterized CSR as the management approach in which the companies incorporate social and environmental concerns into their business operations and interactions with the stakeholders. Yahaya & Lamido (2022) Corporate Social Responsibility (CSR) is defined as an organization's self-regulation mechanism aimed at advancing community objectives of a philanthropic or charitable nature. This is achieved through participation in volunteer services and engagement in ethically oriented activities. Khaniwadekar and Singh Rana (2021) conceptualize Corporate Social Responsibility (CSR) start as the ethical conduct of business, which includes consideration of economic, environmental, social, and factors of human rights. Barnett (2019) emphasizes that CSR encompasses the business practices companies adopt to benefit all the stakeholders involved. Townsend (2020) and Tencati, Misani, and Castaldo (2020) describe CSR as an obligation by companies to adhere to ethically and decently accepted business practices in making substantial contributions to society and the immediate environment. Thus, CSR represents the responsibility of organization to engage in daily activities and practices that enhance business operations while delivering enduring benefits to both stakeholders and the broader society.

2.3 Empirical Review

This section reviews several studies pertinent to the topic.

Famiyeh (2017) examine the impact of Corporate Social Responsibility (CSR) on firm financial performance in Ghana. Using Structural Equation Modeling, the study analyzed the relationship of CSR and corporate financial performance. It was a positive relationship, indicating that CSR initiatives positively influence the firm's financial routine.

Nyeadi, Ibrahim, and Sare (2018) empirically examined the impact of Corporate Social Responsibility (CSR) on financial performance in South African listed companies. Using panel corrected standard errors, their analysis demonstrated that, corporate social responsibility (CSR) has positive significant effects on the financial performance. However, the study did not specify the sectors investigated or provide details on the population or sample used. Similarly, Garcia-Sanchez and Martinez-Ferrero (2018) explored the role of CSR in corporate financial performance (CFP) by examining CEO activities. Their findings revealed that investments in CSR contribute to improved financial standard. Shabbir and Wisdom (2020) studied the

relationship on CSR and corporate performance in both financial and non-financial sectors in Pakistan. It was established that CSR activities and firm performance have a significant relationship.

Ramzan Amin and Abbas (2021) studied the impact of bank's Corporate Social Responsibility (CSR) on the financial performance in 20 Pakistani firms from 2008 to 2017. Their results reveal a corporate social responsibility (CSR) has significant and a substantial positive impact on financial performance. Similarly, Okafor, Adeleye, and Adusei (2021) the study investigated whether Corporate Social Responsibility (CSR) activities by technology companies could improve financial performance in the United States. Analyzing data from 100 S&P 500 corporations between 2017 and 2019, the findings revealed that technology companies investing more in CSR consistently experienced enhanced financial performance. Rana (2018) examined an impact of Corporate Social Responsibility on the financial performance of pharmaceutical companies listed in Pakistan Stock Exchange. The study used various CSR expenditure on healthcare, education, and the environment, as well as Workers Welfare Fund and donations as the proxies for CSR. Financial performance was assessed using Return on Equity (ROE), Return on Assets (ROA), and Earnings per Share (EPS). It was revealing a positive effect of CSR on financial performance, highlighting CSR as a crucial factor for the growth of Pakistan's pharmaceutical sector.

Azumah (2020) investigates the impact of corporate social responsibility (CSR) on the manufacturing firm performance in Nigeria, focusing specifically on the Ariaria Shoe Manufacture and Footwear Company Ltd., Abia, Nigeria, for the period from 2005 to 2006. Annual aggregate data were used to examine the relationship between variables through Ordinary Least Squares (OLS) regression analysis. The performance metrics analyzed include financial indicators such as profit after tax (PAT), asset financial value (AFV), and return on investment (ROI), as well as non-financial indicators, including average manufacturing capacity utilization (AMCU), employee productivity rate (EMR), and business output rate. The results reveal that CSR exerts a positive and statistically significant effect on both financial and non-financial performance of manufacturing enterprises.

Enughulu and Dabor (2018) numerous studies have examined the relationship of Corporate Social Responsibility (CSR) and the performance of corporate entities within the financial sector. The study used sample of ten randomly selected banks. To test their hypotheses, the researchers employed panel data analysis. The findings reveal, a return on capital employed doesn't have significant impact on CSR among the banks studied. However, a positive relationship was identified between return on investment and CSR. Additionally, the study found that net income margin does not have a significant effect on CSR.

Oyewumi, Ogunmeru, and Oboh (2018) analyzed the effects of Corporate Social Responsibility Engagement (CSRE) and Corporate Social Responsibility Disclosure (CSR D) on Return on Assets (ROA) using data panel from 21 banks in Nigeria for the period spanning 2010 to 2014. The regression analysis revealed the results that, disclosing CSR activities has a significant and positive effect on ROA. In contrast, investment in CSR without accompanying disclosure negatively impacts ROA. This suggests that merely investing in CSR initiatives, without effectively communicating these to stakeholders, may not enhance financial performance and could instead lead to a depletion of financial resources.

Szegedi, Khan, and Lentner (2020) investigated corporate social responsibility (CSR) within Pakistan's banking sector, focusing on disclosure practices of CRS and impact on financial performance. Data used for this study were sourced from the financial websites, the State Bank of Pakistan (SBP), and the Pakistan Stock Exchange (PSE) for the period covering 2008 to 2018. The panel data techniques and content analysis were employed. The findings indicate an overall increase on CSR disclosure among operating banks in the sample. The funds that an active involvement in the activities CSR and their effective disclosure have positively

influenced the banks' accounting-based financial performance, so as to measure their performance on return on equity (ROE) and return on assets (ROA).

Yahaya and Lamido (2022) evaluated the impact of corporate social responsibility (CSR) on the financial performance firms in Nigeria as quoted. Correlational research design was employed, sample of 112 firms drawn out of the population of 156. The sample was determined by applying four criteria: inclusion in the Nigerian Exchange Group listed firm as at year ended 2021, exclusion of firms lacking complete annual reports for the past 10 years, exclusion of firms listed after 2021, and exclusion of firms facing technical issues with the Exchange as reported on its website. This resulted in a dataset of 112 firms over a 10-year period, yielding 1,120 observations. Return on assets (ROA), return on equity (ROE), and earnings per share (EPS) proxies the financial performance. Corporate social responsibility (CSR) was measured using an index that incorporated environmental initiatives, human resource activities, gifts, community donations, and research and development of new products. Control variables included firm size and leverage. The analysis, based on p-values, t-values, R-squared, and Prob > F values, indicated a positive and significant CSR is associated with financial performance. However, leverage was excluded from the final model due to specification error test results, while firm size remained as a significant control variable.

Bennett and Obalade (2023) explored the connection among corporate social responsibility (CSR) and financial performance (FP) among South African top commercial banks, an annual time series data for the period 2002-2021 will be utilized. The contribution was made on the existing literature on assessing the impact of CSR on various financial performance measures, including net profit margin (NPM), net profit after tax (NPAT), and return on assets (ROA), thereby providing comprehensive evidence on this relationship. The study employed correlation analysis to determine direct relationship of CSR and FP, and regression analysis to evaluate effects of CSR on financial performance. The findings indicate, CSR has positive impact on NPM, NPAT, and ROA for both the Standard Bank and the Nedbank. The agreed with majority of existing studies that, CSR-FP relationship, suggesting that CSR initiatives are beneficial for enhancing the performance of banks.

Boukattaya, Achour, and Hlioui (2021) examined the relationship between Environmental, Social, and Governance (ESG) performance, Corporate Social Responsibility (CSR), and Corporate Financial Performance (CFP), with the objective of offering guidance for future research. 88 published papers in reputable journals were reviewed using content analysis for the period between 2015 and 2021. These findings highlight the need for further research to explore these relationships more comprehensively and address the gaps identified in the current literature.

Awadzic, Garr, Attah-Botchwey, Sarpong, and Marfo (2023) investigated how corporate social responsibility influences telecom industry financial performance in Ghana. The study used the roles of mediating and moderating variables, specifically corporate reputation (CR) on the customers' purchasing intention (CPI). A cross-sectional data was used, the researchers employed structural equation modeling through Smart PLS to analyze the relationships between CSR and financial performance. The impact of CSR on financial performance yields significantly positive results, indicating a direct relationship between CSR and firm performance. The analysis also revealed that CSR positively affects financial performance through the mediating role of CPI, whereas CR was not found to mediate this relationship. Additionally, CPI did not moderate the relationship between CSR and financial performance. These findings highlight the direct benefits of CSR on financial performance and suggest that, while CPI mediates the CSR-financial performance relationship, neither CR nor CPI moderates this link.

Nguyen, Bui, and Le (2022) explored the corporate social responsibility (CSR) relationship between with corporate financial performance (CFP) using multi approach method to measure

CSR. Financial performance was assessed through return on assets (ROA), return on equity (ROE), and net interest margin (NIM). A sample of Vietnamese commercial banks was carried out for a period of eight years 2012 to 2019. A generalized method of moments (GMM) estimator for regression analysis and a dynamic panel model was employed. The findings reveal a positive effect of both corporate social responsibility expenditure (CSRE) and corporate social responsibility disclosure (CSRSD) on the financial performance of banks. In addition, the analysis highlights positive impact of specific CSR components on financial performance, particularly on environmental and employee responsibility. However, the community responsibility influence on financial performance was not found to be significant. Belasri, Gomes, and Pijourlet (2020) on their study an impact of corporate social responsibility (CSR) on bank efficiency. The model used was Data Envelopment Analysis (DEA). Their empirical study, used 184 banks sample across 41 countries for a period from 2009 to 2015, demonstrates that a CSR on bank efficiency has a positive impact. The results were that, the institutional context relationship was influenced. Specifically, CSR is positively affecting the efficiency of developed countries bank, in countries that has high protection on their investor, and in nations with high degree of stakeholder orientation. Instead of relying on measuring univariate performance such as return on assets (ROA), return on equity (ROE), or net interest income (NII), the study employs technical efficiency as a comprehensive performance measure.

Hsueh-Li Huang, Liang, and Chu (2022) investigated an effect of corporate social responsibility (CSR) and corporate governance on cost efficiency in both consolidated and non-consolidated banks. The study analyzed a sample of 37 Taiwanese banks from 2008 to 2016, employing stochastic frontier analysis (SFA) was employed separately to assess the impacts. Additionally, it was used to compare between cost efficiency of consolidated and non-consolidated banks. It was reveals that, CSR positively influences cost efficiency in consolidated banks, enhancing their operational performance. For consolidated banks, greater diversity in board backgrounds is associated with improved efficiency. Conversely, the increase proportion of an independent directors in non-consolidated banks is linked to reduced cost efficiency. An increase in foreign shareholding is associated with a decline in the both consolidated and non-consolidated banks cost efficiency. Both the technology gap ratio (TGR) and meta-cost efficiency (MCE) metrics indicate the consolidated banks exhibit superior efficiency compared to non-consolidated banks. Based on these findings underscore the importance of CSR and corporate governance structures in enhancing bank efficiency and highlight differences in performance based on bank consolidation status. From the foregoing, evidence on relationship among corporate social responsibility and bank cost efficiency is scarce not to mention scanty articles on social corporate responsibility cost efficiency in Nigerian banks. This study attempts to fill the gap.

2.4 Theoretical framework

This study theoretical framework rests legitimacy and microeconomic theory

2.4.1 Legitimacy Theory

Enughulu and Dabor (2018) offer a perspective on the interaction between a firm and its immediate environment through the lens of legitimacy theory. They argue that societal expectations are fundamental to communal existence and essential for a firm's viability. According to this theory, a firm's success depends not only on market forces but also on meeting societal expectations. Consequently, understanding and addressing the broader concerns of the public, as articulated through societal expectations, is crucial for a business's continued existence. The theory posits that a business must fulfill its civic responsibilities by addressing societal needs and providing basic social amenities to its immediate environment.

2.4.2 Microeconomic Theory

The concept of cost efficiency rooted in the theory of microeconomic firm and originates from the foundational work of Debreu (1951), who established a standard framework for assessing productive efficiency. This framework is based on the premise that a firm exhibiting higher economic efficiency has a competitive edge over its rivals. Neoclassical theory of economic forms a model's firms as 'black boxes' that convert information from the input to output decisions. This change process is governed by a production frontier, which defines maximum output achievable from the given set of inputs. According to neoclassical theory, firms operate within perfectly competitive markets with the primary aims of profit maximization. To achieve its targets, company must focus on maximizing revenues while simultaneously minimizing costs. Phiri, Kaluwa, and Mazalale (2021) observed that this pursuit of efficiency leads to a general competitive equilibrium, where firms earn rewards proportional to the marginal contributions to production. Supernormal profits attract new entrants into the market, increasing competition and driving the restoration of equilibrium. Conversely, firms that fail to achieve normal profits due to inefficient operations are compelled to either cease operations or be acquired by more efficient firms.

3. Methodology

This section explains the methodology employed. The section covers the research design, population of the study, sample size, and sampling technique. Method of collecting data and data analysis techniques used was also explained in this section.

An ex-post facto research design was used to analyze commercial banks in Nigeria. The population under investigation includes all commercial banks in Nigeria as of December 31, 2021, totaling twenty-three banks. A purposive sampling technique was utilized to select banks with either international or national banking licenses. Consequently, a sample of nineteen banks was identified, including: Access Bank Plc, Fidelity Bank Plc, First City Monument Bank Plc, First Bank Nigeria Limited, Guaranty Trust Bank Plc, Union Bank of Nigeria Plc, United Bank for Africa Plc, Citibank Nigeria Limited, Zenith Bank Plc, Ecobank Nigeria Plc, Keystone Bank Limited, Heritage Bank Limited, Polaris Bank Plc, Stanbic IBTC Bank Plc, Standard Chartered Bank Limited, Sterling Bank Plc, Titan Trust Bank Ltd, Unity Bank Plc, and Wema Bank Plc. The selection of these nineteen banks was justified by their accessible and consistent financial data.

The secondary materials were used as sourced of data and it includes journals, the Nigerian Exchange Group Fact Book, financial statements and accounts of the banks, the Central Bank of Nigeria's annual bulletin, and the Statista website.

The analysis utilizes a parametric mathematical optimization approach rooted in Stochastic Frontier Analysis (SFA), with Frontier 4.1 software employed for this purpose. SFA models the efficiency of production processes by considering outputs as functions of inputs, inefficiency, and random error. This approach requires defining distribution of error term and allows for an estimation of efficiency with multiple homogeneous types of inputs and outputs. Thus, the efficiency of any production process is calculated directly from its outputs, which are functionally related to its inputs.

3.1 Input-Output Variables

In line with Hsueh-Li Huang, Liang, and Chu (2022), the study employs an intermediation approach to identify the two variables for bank efficiency estimations. The intermediation approach conceptualizes banks as financial intermediaries which facilitate the funds flow between the parties (depositors and borrowers). Best on this, an intermediation services provided by the bank to collect deposits and other liabilities and allocating these funds to interest-earning assets, such as loans, securities, and investments.

For the purpose of our study, the input variables are defined as, the total capital available for the bank’s operations, and the workforce involved in banking operations. While, the output variables considered in this analysis are, the aggregate amount of loans extended by the bank, the total investments made by the bank, and income generated from sources other than interest, such as fees and commissions. This approach is for comprehensive evaluation of the efficiency of banks by focusing on their role in financial intermediation and the effectiveness of their resource allocation.

3.2 Inefficiency Variables

The corporate social responsibility, bank-specific variables and the macroeconomic variables are the variables of the inefficiency model in this study.

Corporate Social Responsibility

In line with Harun Hussainey, Kharuddin & Al Farooque (2020) Corporate Social Responsibility is measured using dummy variable. Dummy variable identifies banks that undertake Social Responsibilities ‘‘1’’ and otherwise ‘‘0’’.

3.3 Bank-specific Variables and Macroeconomic Variables

This study also incorporates bank characteristics and macroeconomic variables into the analysis. Bank Characteristics in terms of size: Signified the natural logarithm of the entire assets, this variable provides a portion of the bank's scale and capacity. Financing to Deposit Ratio (FDR): This ratio compares the bank provide the total funding that the funds it received by the third-party. It reflects the proportion of deposits that are used for financing purposes.

Macroeconomic Variables: GDP Growth (GDP): Real growth rate variable measures of the Gross Domestic Product, indicating the overall economic expansion or contraction. Inflation (Inf): Defined as the annual percentage increase in the indexes of consumer price, this variable reflects changes in the cost of living and the general price level of goods and services. Including these variables, the study is to provide a more detailed analysis of factors influencing bank efficiency, considering both internal bank characteristics and broader economic conditions.

3.4 Model Specification

The study utilize the stochastic frontier cost functions developed by Battese and Coelli (1995) to assess the efficiency of banks. The model, which accommodates (m) outputs and (n) inputs, is expressed as follows:

$$\ln TC_{it} = \ln f(\gamma_{it}, \rho_{it}, \beta) + v_{it} + \mu_{it} \dots \dots \dots (1)$$

TC_{it} = banks total cost i at time t, γ_{it} = banks output i at time t, ρ_{it} = input price of the bank i at time t, β = parameter is assessed, v_{it} and μ_{it} The random error terms are assumed to be both individually and mutually independent, while v_{it} and μ_{it} represents a function of firm-specific factors influencing cost inefficiency. Specifically, μ_{it} is distributed according to a truncated normal distribution, defined as: $\mu_{it} \sim N^+(m_{it} \sigma_{\mu}^2)$ and $v_{it} \sim N^+(m_{it} \sigma_{\mu}^2)$

The general trans log cost frontier model

$$\begin{aligned} \ln TC = a_0 &+ \sum_{i=1}^m \alpha_i \ln Y_i + \sum_{j=1}^n \beta_j \ln P_j + \frac{1}{2} \sum_{i=1}^m \sum_{j=1}^m a_{ij} \ln Y_i \ln Y_j \\ &+ \frac{1}{2} \sum_{i=1}^n \sum_{j=1}^n Y_{ij} \ln P_i \ln P_j + \sum_{i=1}^m \sum_{j=1}^n P_{ij} \ln Y_i \ln P_j \\ &+ v + \mu \dots \dots \dots (2) \end{aligned}$$

TC Is represents by the total cost DMU’s, Y_i is output i, (total loans, Investment and non-interest) and P_j is the jth input (capital price, fund and price of labour). v_{it} and μ_{it} are the random error terms, that are assumed to be mutually independent and individual and, and μ_{it}

is a firm-specific factors function that cost inefficiency is affect. Specifically, μ_{it} belongs to a truncated normal distribution, given by $\mu_{it} \sim N^+(m_{it} \sigma_{\mu}^2)$ and $v_{it} \sim N^+(m_{it} \sigma_{\mu}^2)$

This study utilizes an inefficiency model to investigate the impact of corporate social responsibility (CSR) on bank cost efficiency. The cost inefficiency model of Equation (2) is fully expressed as:

$$\mu_{it} \sim N^+(m_{it} \sigma_{\mu}^2)$$

$$M_{it} = \delta_0 + \delta_1 z_{1t} + \delta_2 z_{2t} + \delta_3 z_{3t} + \delta_4 z_{4t} + \delta_5 z_{5t} \dots \dots \dots (3)$$

In this equation, i represents the i^{th} different bank; t represents the t^{th} period; δ is a vector of parameters to be estimated.; z_{it} is the cost-inefficient variable, including (1) Corporate Social Responsibility (z_{1t}); (2) Size (z_{2t}); (3) Financing to Deposit Ratio (z_{3t}); (4) GDP growth (z_{4t}); (5) inflation (z_{5t}). Here, cost inefficiency is set as $CE_{it} = e^{u_{it}}$ and $CE_{it} \geq 1$, meaning that the closer the CE value is to 1, the more efficient it is; but the larger the value, the less efficient bank is.

4. Result and Discussions

This segment provides an analysis of the methodologies employed, discusses hypothesis testing procedures, and addresses issues related to the findings in the context of existing literature.

Table 1: Stochastic Frontier Cost Function Estimations for Banks

Model	Unstandardized Coefficients		T	Sig.
	B	Std. Error		
1 (Constant)	5.786	0.897	5.538	.000
$\ln Y_1$	0.430	0.854	4.100	.062
$\ln Y_2$	0.714	0.354	1.525	.011
$\ln Y_3$	-1.056	0.637	2.177	.023
$\ln \times (\rho1/\rho2)$	2.677	1.748	1.132	.044
$\ln \times (\rho3/\rho2)$	-0.745	0.063	1.914	.012
$1/2 \times (\ln Y_1)^2$	0.515	0.051	1.029	.701
$1/2 \times (\ln Y_2)^2$	0.073	0.039	2.961	.027
$1/2 \times (\ln Y_3)^2$	0.788	1.078	0.969	.021
$\ln Y_1 \times \ln Y_2$	-0.971	0.057	1.720	.502
$\ln Y_1 \times \ln Y_3$	-0.019	0.068	2.542	.011
$\ln Y_2 \times \ln Y_3$	-0.872	0.077	1.198	.033
$1/2 [\ln \times (\rho1/\rho2)]^2$	-0.095	0.075	1.502	.610
$1/2 [\ln \times (\rho3/\rho2)]^2$	-1.241	0.061	1.121	.042
$\ln(\rho1/\rho2) \times \ln(\rho3/\rho2)$	-0.073	0.044	2.523	.801
$\ln Y_1 \times \ln (\rho1/\rho2)$	-0.053	0.039	2.466	.034
$\ln Y_1 \times \ln (\rho3/\rho2)$	0.027	1.048	1.556	.120
$\ln Y_2 \times \ln (\rho1/\rho2)$	0.146	0.074	1.179	.902
$\ln Y_2 \times \ln (\rho3/\rho2)$	-0.063	0.025	2.523	.031
$\ln Y_3 \times \ln (\rho1/\rho2)$	0.059	0.047	2.135	.053
$\ln Y_3 \times \ln (\rho3/\rho2)$	-0.337	0.017	4.106	.072
$t \times \ln Y_1$	0.017	0.163	4.023	.015
$t \times \ln Y_2$	0.023	0.025	3.125	.678
$t \times \ln Y_3$	-0.033	0.032	2.265	.043
$t \times \ln (\rho1/\rho2)$	-1.083	0.937	0.187	.034
$t \times \ln (\rho3/\rho2)$	-0.287	0.546	1.513	.047

Source: Generated by the researchers using Frontier 4.1.

Model	Unstandardized Coefficients		T	Sig.	
	B	Std. Error			
1	t	-0.297	2.748	1.731	.018
	t^2	-0.040	0.044	1.131	.027
	$\sigma_u^2 + \sigma_v^2$	0.013	0.015	2.323	.016
	γ	0.783	0.042	12.614	.984

Source: Generated by the researchers using Frontier 4.1

a. Output: Y_1 is loan; Y_2 is investment; Y_3 is non – interest income

b. Input : p_1 is price of labour; p_2 is price of capita; p_3 is price of fund

The above table, more than half of the estimated cost function variables are significant at 5% level, suggesting that the stochastic frontier model exhibits a strong fit to the data. The cost-efficiency is calculated at each bank by the cost-efficiency definition function as $CE_{it} = e_{kt}^u$, where: $1 < CE_{it} < \infty$. In line with Hsueh-Li huang, Liang & Chu.,(2022), this study finds that the value efficiency in-between 1 and ∞ , is closer to 1 showing the higher levels of efficiency).

Table 2: Inefficiency Model

Model	Unstandardized Coefficients		T	Sig.	
	B	Std. Error			
1	(Constant)	1.213	0.376	0.639	.000
	CSR	0.710	0.025	1.132	.012
	BSize	0.613	0.665	2.523	.001
	FDR	1.063	0.631	1.167	.003
	GDPg	-0.940	0.631	1.234	0.021
	Inf	0.287	0.443	0.614	.004

Source: Generated by the researchers using Frontier 4.1.

The relationship between the CSR and the Bank efficiency is significantly positive. This shows that banks which has a good CSR and a capability that can increase the efficacy by lowering the cost of inputs used such as lower deposit rates; with a good use of input for instance good human capital management and an increase in output through higher fees charged to clients as well as higher interests charged on clients’ loans. Based on the stakeholder view to maintaining good relations with stakeholder’s result is a higher competitive advantage. This CSR-induced competitive advantage which can lead to an improvement of the bank's reputation, productivity and loyalty of the employee, and the ability to maintain product prices. This result is consistent with a previous study of Belasri, Gomes, & Pijourlet (2020).

For Bank characteristics and macroeconomic variables, bank size (BSize) the bank efficiency has a positive influence with level of significance at 0.05 ($\alpha=5\%$). The study suggests that the capital is a key factor in enhancing cost efficiency within banks, supported by government policies enforcing minimum capital requirements. This implies that larger banks benefit from higher cost efficiency scores due to economies of scale and scope. Stronger banks are better positioned to attract highly qualified and experienced professionals and possess the financial capacity to maintain an optimally diversified investment portfolio, even in uncertain environments. Financing to Deposit Ratio (FDR) with a positive influence and a level of significance at 5%, which means the higher funding distribution, the more efficient the banks.

For macroeconomic variables, GDP with negative and significant effect on the bank efficient that is to say a growing economy can enables businesses to operate more efficiently. The result promotes a high economic growth, with an increase in the business environment and reduces bank entry barriers. Accordingly, banks' profitability improves as competition diminishes. The influence in inflation rate is significantly positive on cost efficiency in banks. In inflationary environments, banks are compelled to be more cost-conscious and to restrict their credit lending to mitigate credit losses. In this situation, a bank can anticipate inflation

rates and adjust interest rates accordingly to better align with its costs, thereby increasing its potential to earn higher economic profits.

5. Conclusions and Recommendations

This study examines the effect of corporate social responsibility (CSR) on bank cost efficiency. The results demonstrate that, the CSR has a statistically significant positive impact on bank cost efficiency. The study concludes that engaging in CSR is not a waste of resources for banks; rather, it can generate financial benefits and enhance efficiency. Consequently, it is recommended that banks integrate CSR activities into their business strategies. This approach can improve the bank's image, enhance performance, mitigate risks, and subsequently increase overall efficiency.

Reference

- Adepoju A. A and Mustapha, S. A. (2021). Measuring the efficiency of selected quoted banks in Nigeria: DEA Approach. *Fuoye Journal of Accounting and Management*, 1(5), 103–119.
- Ajayi, M. A., Nageri, I.K., Abogun, S. & Abdulmumin, B.A. (2017). Evaluation of Deposit Money Bank's Efficiency in Nigeria: Data Envelopment Analysis. Oshogbo. *Journal of Management (OJM)*, 2(1), 68 –83.
- Alhassan,I., & Islam,K.M.A.(2019).The Impact of Environmental and Social Disclosures on the Financial Performance of Oil and Gas Companies in Nigeria. *The Millennium University Journal*, (4)1, 89-90.
- Al-Tit, A. (2016). The Impact of Lean Supply Chain on Productivity of Saudi Manufacturing Firms in AL-Qassim Region. *Polish Journal of Management Studies*, 14(1), 18-27.
- Awadzie, D.M., D., Garr, D.K., Attah-Botchwey, E.,Sarpong,K.K., & Marfo,M., (2023). Does Corporate Social Responsibility Promote the Financial Performance of the Telecom Industry in Ghana? *Cogent Business & Management*, 10, 1-19.
- Azumah, J. (2020). Impact of Corporate Social Responsibility on the Performance of Manufacturing Firms in Nigeria. *International Journal of Managerial Studies and Research*, 8(7), 1–15. <https://doi.org/10.20431/2349-0349.0807001>
- Barnett, M. L. (2019). The Business Case for Corporate Social Responsibility: A Critique and an Indirect Path Forward. *Business & Society*, 58(1), 167–190.
- Belasri, S., Gomes,M., & Pijourlet.G. (2020) .Corporate Social Responsibility and Bank Efficiency. *Journal of Multinational Financial Management*, 54, 1-26.
- Bennett,N., & Obalade,A. (2023). The Effect of Corporate Social Responsibility on Bank Performance in South Africa. *Journal Of Accounting and Management*, 13(1) , 18-28
- Bhatia, A., & Mahendru,M., (2018).Cost Efficiency of Scheduled Commercial Banks: Empirical Evidence from India. *Business Analyst*, 38(2), 58-90.
- Binh,T.V., Mulatu,A., & Xu,B., (2022). Corporate Social Responsibility and Firm Efficiency: Evidence from Endogenous Cost Inefficiency Stochastic Frontier Analysis, *Applied Economics*, 54:55, 6380-6392.
- Boukattaya,S., Achour,Z., & Hlioui,Z.(2021).Corporate Social Responsibility and Corporate Financial Performance: An Empirical Literature Review. *International Journal of Innovative Research and Publications*, 1(3), 1-32.
- Cicea, C. (2020). Performance in Public Management: A Research Agenda with Bibliometric Approach. *Administrative and Management Public*, 35,109–23.
- Debreu, G. (1951). The Coefficient of Resource Utilisation. *Econometrica*, 19, 273-292.
- Enughulu, S., & Dabor,R.O. (2018). Corporation Social Responsibility and Bank Performance in Nigeria. *International Journal of Dynamic Economics and Business*, 2(4), 317-330.

- Famiyeh, S. (2017). Corporate Social Responsibility and Firm's Performance: Empirical Evidence. *Social Responsibility Journal*, 13(2), 390-406.
- Fongtanakit, K.(2023). Measuring Bank Efficiency in the ASEAN Economic Community *Journal of Public Administration, Public Affairs, and Management*, 37-61.
- Fourati, Y. M., & Dammak, M. (2021). Corporate Social Responsibility and Financial Performance: International Evidence of the Mediating Role of Reputation. *Corporate Social Responsibility and Environmental Management*, 28(6), 1749-1759.
- Harun, M. S., Hussainey, K., Kharuddin, K. A. M., & Al Farooque, O. (2020). CSR Disclosure, Corporate Governance and Firm Value: A Study on GCC Islamic Banks. *International Journal of Accounting & Information Management*, 28(4), 607–638.
- Hsueh-Li huang, Liang,L.W. Chu,Y.C.S.(2022). The Impact of Corporate Social Responsibility and Corporate Governance on Bank Efficiency. Comparative Analysis of Consolidated and Non- Consolidated Banks. *Romanian Journal of Economic Forecasting – XXV (3)*, 105-127.
- Hsu, B. X., & Chen, Y. M. (2023). The Relationship between Corporate Social Responsibilities, External Orientation, and Environmental Performance. *Technological Forecasting and Social Change*, 188, 122278.
- Jamali, H. (2020). Banking Governance, Financial Performance and Corporate Social Responsibility. *Journal of Management*, 24 (3), 497-512.
- Lusiana,M., Che Haat,M.H., Saputra, J., Yusliza,M.Y., & Muhammad, Z.(2021). A Review of Green Accounting, Corporate Social Responsibility Disclosure, Financial Performance and Firm Value Literature Proceedings of the 11th Annual International Conference on Industrial Engineering and Operations Management Singapore, March 7-11.
- Nguyen, TV. Bui, H. T. T., & Le, C. H. D. (2022). The Impacts of Corporate Social Responsibility to Corporate Financial Performance: A Case Study of Vietnamese Commercial Banks. *Cogent Economics & Finance*, 10, 1-22.
- Nyead, J. D., Ibrahim, M., & Sare, Y. A. (2018). Corporate Social Responsibility and Financial Performance Nexus: Empirical Evidence from South African Listed Firms. *Journal of Global Responsibility*. <https://doi.org/10.1002/Csr.1817>
- Nyong, M. O. (2017). Relative Efficiency of Commercial Banks in Nigeria: A Nonparametric Mathematical Optimisation Analysis. *Noble International Journal of Economics and Financial Research*, 2(2), 27-49.
- Octrina, F., & Mariam, A.G.S.(2021). Islamic Bank Efficiency in Indonesia: Stochastic Frontier Analysis. *Journal of Asian Finance, Economics and Business*, 8(1), 751–758.
- Okafor, A., Adeleye, B. N., & Adusei, M. (2021). Corporate Social Responsibility and Financial Performance: Evidence from US Tech Firms. *Journal of Cleaner Production*, 292, 126078.
- Oke, D. A., Ogbuji, I. A. & Bokana, K.G. (2017). Deposit Money Banks' Efficiency in Three Years After, During and Before the 2004–2005 Consolidation in Nigeria. *The Puzzle on Size, Banks and Bank Systems*, 12(3), 193-203.
- Oyewumi, O.R., Ogunmeru, O.A., & Oboh, C.S. (2018). Investment in Corporate Social Responsibility, Disclosure Practices, and Financial Performance of Banks in Nigeria. *Future Business Journal*, 4(2), 195–205.
- Phiri, H., Kaluwa, B., & Mazalale, J. (2021).Cost Efficiency of the Banking Industry in Malawi. *Economics*, 10 (4), 164-174.

- Ramzan, M., Amin, M., & Abbas, M. (2021). How Does Corporate Social Responsibility Affect Financial Performance, Financial Stability and Financial Inclusion in the Banking Sector? Evidence from Pakistan. *Research in International Business and Finance*, 55, 101314.
- Rana, I. (2018). Impact of Corporate Social Responsibility on Financial Performance Evidence From Pharmaceutical Sector Listed Companies of Pakistan. *European Business & Management*, 4(1), 1. <https://doi.org/10.11648/J.Ebm.20180401.11>.
- Rezaeinejad, I., Khaniwadekar, A., & Singh Rana, K. (2021). The Analytic Study of the Russian Experience in the Context of Corporate Social Responsibility (CSR): The Lessons for Iran and Developing Countries. *SHS Web of Conferences*, 114, 01028.
- Sardar, A., Azeem, M. M., Hassan, S. & Bakhsh, K. (2013). Comparison of Efficiency Between Pure Islamic Banks and Islamic Bank Windows and the Role of Islamic Banking in the Agriculture Sector, *Journal of Agricultural Science*, 50(1), 155–161.
- Setiawati, E., Sekarningrum, A., & Witono, B. (2023). Analysis of CSR Disclosure, Earnings Persistency, Earnings Growth, and Business Size on Earnings Management With Institutional Ownership as a Moderating Variable (Case Study On LQ45 Companies Listed On The Indonesia Stock Exchange (IDX) 2016-2020). *Riset Akuntansi Dan Keuangan Indonesia*, 7(2), 227-243.
- Shabbir, M. S., & Wisdom, O. (2020). The Relationship between Corporate Social Responsibility, Environmental Investments and Financial Performance: Evidence from Manufacturing Companies. *Environmental Science and Pollution Research*, 27(32), 39946-39957.
- Szegedi, K., Khan, Y., & Lentner, C.(2020).Corporate Social Responsibility and Financial Performance: Evidence from Pakistani Listed Banks. *Sustainability*, 12, 1-19.
- Tencati, A., Misani, N., & Castaldo, S. (2020). A Qualified Account of Supererogation: Toward A Better Conceptualization of Corporate Social Responsibility. *Business Ethics Quarterly*, 30(2), 250–272.
- Tijani, A. A. (2022). Efficiency Performance of Selected Manufacturing Firms in Nigeria, *Ekonomicko-Manazerske Spektrum*, 16(1), 25-34.
- Townsend, B. (2020). From SRI to ESG: The Origins of Socially Responsible and Sustainable Investing. *The Journal of Impact and ESG Investing*, 1(1), 10–25.
- Ullah S, Majeed A., & Popp, J., (2023) Determinants of Bank's Efficiency in an Emerging Economy: A Data Envelopment Analysis Approach. *Plus ONE*, 18(3), 281663.
- Yahaya, O. A., & Lamido, I. A. (2022). Corporate Social Responsibility and Financial Performance: Evidence from Nigeria. *International Journal of Accounting and Finance Review*, 10(1), 107-120.