UNIVERSITY OF CAPE COAST

CORPORATE GOVERNANCE AND PROFIT PRODUCTIVITY OF LISTED BANKS IN GHANA

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BY

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DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's signature……. Date……

Name: Prosper Kodzo Kushiegbor

Supervisor's Declaration

I hereby declare that preparation and presentation of the dissertation were supervised in accordance with the guidelines on supervision of dissertation laid down by the University of Cape Coast.

Supervisor's signature……. Date: ……

Name: Prof. Siaw Frimpong

ABSTRACT

The study examined the impacts of corporate governance on the profit productivity of the listed banks on the Ghana Stock Exchange between 2010 and 2020. The study used eight banks listed on the Ghana Stock Exchange between 2010 and 2020. The study employed a non-parametric method of Data Envelopment Analysis at its first stage that determined the efficiencies of the banks. In addition, the Malmquist Productivity Index (MPI) is used to evaluate the banks' total productivity change. The first stage results indicated that none of the listed banks achieved optimal operational efficiency. In addition, it was revealed that pure technical efficiency increased. The total productivity change analysis of the banks revealed that five of the eight (8) have their total factor productivity increased over time. The study used Random-Effects Generalized Least Squares Regression analysis at the second stage that examined the impacts of corporate governance variables on the profit productivity of the listed banks. The study concludes that increasing board size and diversity have increased bank profitability as board size and diversity boost GSE-listed bank profit productivity. Similarly, bank size and expansion in banking sector activities positively affect banks' profit productivity. On the contrary, executive share compensation and financial leverage do not influence the profit productivity of the banks in any way. The study recommends that bank managers strengthen their managerial abilities to match technology improvements in the banking business. Boards should also improve bank directors' and executives' executive share compensation to incentivize them to accomplish more.

KEYWORDS

Productivity

Profitability

Pure Technical Efficiency

Technical Efficiency

Technological Change

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DEDICATION

To my industrious wife, Mrs. Evelyn Seyram Akpakah.

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CHAPTER ONE

INTRODUCTION

Corporate governance plays a crucial role in the profitability and productivity of listed banks in Ghana, as it does in financial institutions worldwide. Effective corporate governance ensures that banks are managed and controlled in a manner that maximizes shareholder value, safeguards the interests of stakeholders, and maintains the stability of the financial system. This chapter of the study discuses the background to the study, the problem statements, the objectives of the study as well as the hypotheses formulated from the objectives of the study. The remaining sub-heading of the study highlights on the significance of the study, the scope of the study, the purpose of the study, the limitations and the organization of the study.

Background of the Study

The global economy relies heavily on the financial sector, which holds significant importance. In Ghana, the banking system plays a substantial role in contributing to the country's overall GDP. For instance, statistical data indicates that the financial industry in Ghana contributed 7.7% and 7.2% to the country's GDP in 2019 and 2020, respectively (Ghana Statistical Service, 2021). This industry also saw a 22.4% increase in assets during 2020. While business development might not be the primary goal for many companies worldwide due to the ongoing COVID-19 pandemic, the unique circumstances in Ghana. This prompted by the pandemic, have led businesses to prioritize development to ensure survival and sustainability (PWC, 2020).

Numerous studies have assessed the effectiveness and dynamic performance of banks, highlighting their significance. To effectively serve as

intermediaries, banks need to compete on a global scale within a competitive environment (Mustapha et al., 2020; Kosrat, 2021; Ahmad, 2020; Kumar & Gulati, 2009). Addressing the principal-agent dilemma requires robust corporate governance measures within banks (Azar & Micali, 2018; Kou, 2017). These measures involve methods for monitoring and guiding organizations (Liu & Liu, 2013; Yoo & Koh, 2014). Governance strategies are crucial as they are believed to impact the performance of financial institutions, aiding in resolving issues of principal-agent conflict and information asymmetry.

Corporate governance is defined as the consistent management of a specific area of responsibility within an autonomous legal entity that differs from other companies. This concept emphasizes transparency, structure, and adherence to legal frameworks. In the context of corporate governance, Almoneef and Prasad-Samontaray (2019) emphasize the role of the board of directors and top management in a company's management processes. They underline the significant connection between board decisions, profitability, reputation, and share price outcomes, noting that this link's strength varies.

To put it differently, corporate governance pertains to the framework established by the board of directors for operational guidelines. This encompasses focusing on core activities, realistic goal-setting, value creation, cost reduction, fostering a change-embracing company culture, and aligning with industry trends. Challenges in corporate governance include integrating e-business operations, optimizing resource allocation, risk management, and maintaining effective governance (Grove et al., 2011).

Oyarzn (2011) contends that the principal-agent dilemma can be mitigated by adopting the central premise. This dilemma arises when

management, acting as agents, prioritize their own interests over those of shareholders. Increased internationalization of business, heightened financial reporting demands, and corporate failures have brought more attention to organizational management in recent years. Notably, financial scandals in the early 21st century have contributed to this focus (Lopatta, Buchholz, & Kaspereit, 2012).

Many studies lack emphasis on the profit-oriented aspects of banking efficiency and productivity, often focusing on technical and cost-related productivity instead of profit productivity. Enhancements in bank productivity aren't typically linked to changes in corporate governance. Based on Juo, Fu, Yu, and Lin's (2015) dynamic profit-driven productivity model, a new estimation approach has been introduced, encompassing efficiency and innovation components. Using these insights, a profit-oriented dynamic efficiency index has been developed for shareholding banks in Ghana.

Finally, the research identifies and quantifies key corporate governance mechanisms that impact Ghanaian banks' profit-oriented dynamic productivity. Empirical analysis utilizes Simar and Wilson's (2011; 2007) truncated regression model to determine the link between corporate governance and Ghanaian banks' dynamic profit productivity, while considering external factors.

Statement of the Problem

Despite the recognized significance of effective corporate governance in influencing the performance and sustainability of financial institutions, there remains a gap in our understanding of how corporate governance practices specifically impact the profit productivity of listed banks in Ghana.

While the country's banking sector has witnessed substantial growth and regulatory reforms in recent years, the intricate relationship between corporate governance mechanisms and the financial performance of these banks necessitates deeper exploration (Mohsin Jadah al. et, 2020; Alzoubi, 2018; Alhassan & Biekpe, 2015).

The lack of a comprehensive study addressing this specific nexus poses a significant research gap. This study aims to bridge this gap by investigating the multifaceted interplay between corporate governance practices, encompassing board composition, transparency, risk management, regulatory compliance, stakeholder engagement, and more, and the profit productivity of listed banks in Ghana (Bokpin, 2013; Hardwick & Kwon, 2014; Liao, 2021). The outcomes of this research are anticipated to provide valuable insights into the specific governance factors that contribute to enhanced profit productivity, enabling stakeholders, regulators, and banks themselves to make informed decisions that bolster the resilience, stability, and growth of the banking sector in Ghana.

Within the context of the rapidly evolving banking landscape in Ghana, the intricate relationship between corporate governance and profit productivity of listed banks presents a pressing concern. While the country has made significant strides in improving its financial regulatory framework and fostering an environment conducive to business growth, the extent to which corporate governance practices impact the bottom-line performance of these banks requires a more comprehensive investigation.

The problem at hand is multifaceted. First, there is a lack of in-depth empirical research that delves into the specific corporate governance mechanisms employed by listed banks in Ghana and how these mechanisms

are linked to their profit productivity. Despite the widespread acknowledgment of the importance of effective governance in enhancing financial performance, there is a paucity of data-driven studies that establish a clear causal relationship between corporate governance practices and profit productivity within the Ghanaian banking sector (Adjei-Frimpong et al., 2014; Ishaq & Bokpin, 2012; Ohene-Asare & Alhassan, 2013).

Second, as the Ghanaian banking sector continues to attract attention from both domestic and international investors, the need for transparency, accountability, and ethical conduct becomes paramount. The absence of a comprehensive study on the influence of corporate governance practices on profit productivity leaves a critical knowledge gap in understanding which governance structures, board compositions, risk management strategies, and stakeholder engagement approaches are most effective in fostering sustainable profit growth for listed banks. Furthermore, the ongoing global shifts towards greater emphasis on environmental, social, and governance (ESG) factors highlight the need for banking institutions to align their governance practices with sustainability objectives. However, the exact role of corporate governance in promoting ESG integration and its subsequent impact on profit productivity in the Ghanaian banking context remain areas requiring significant exploration.

In light of these challenges, this research aims to address the gap in the literature by conducting a comprehensive analysis of the relationship between corporate governance practices and the profit productivity of listed banks in Ghana. By investigating the specific governance mechanisms, structures, and strategies that correlate with enhanced financial performance, this study seeks to provide actionable insights for both regulators and banking

institutions. The findings will not only contribute to academic scholarship but also offer practical recommendations for fostering a stronger and more resilient banking sector that thrives on the foundation of effective corporate governance practices, ultimately benefiting the broader Ghanaian economy.

Purpose of the Study

The purpose of the study sought to examine the effects of corporate governance on profit productivity of listed banks on the Ghana Stock Exchange by non-parametric approach of measuring profit productivity.

Research Objectives

The following are the specific aims.

1. To gain insight into the listed banks' productivity, technological, and efficiency changes.
2. To investigate the association between corporate governance variables and total factor productivity of the listed banks on Ghana Stock Exchange and their impact on profit productivity.
3. To determine the effect of corporate governance on the change in profit productivity of listed banks in Ghana.

Research Questions

Following are some questions that the research hopes to address to meet its stated goals.

1. How are the productivity, technological, and efficiency changes of listed banks in Ghana measured?
2. What is the relationship between corporate governance variables and total factor productivity of the listed banks on Ghana Stock Exchange and their impact on profit productivity?

3. Does corporate governance significantly impact the change in profit productivity of listed banks in Ghana?

Significance of the Study

Corporate governance and profit productivity change in listed Ghanaian banks are examined in this study, which attempts to highlight policy and management decisions by examining how corporate governance influences profitability. This study's findings can be applied to policy, practice, and academic literature. To adequately inform the financial sector's policymakers on the banks' economic condition, an evidence-based evaluation of profit-oriented dynamic productivity can help educate the policymakers of the industry on various metrics of overall productivity gains. Furthermore, by doing so, the Bank of Ghana can be adequately educated on bank profit productivity changes over time together with their determinants to create growth-oriented banking policies or restrictions.

Bank managers may now see which financial products and activities have the most impact on their product development. Suppose management determines that corporate governance mechanisms are essential to profit productivity growth. In that case, they can then make important decisions about whether to invest in these processes and other environmental circumstances or why they should concentrate on some methodologies and de-invest mineral wealth from others.

Delimitations of the Study

The Ghana Stock Exchange website was used to collect the study's data, which was then cross-validated against the records of the Ghana Association of Bankers. From 2010 to 2020, a total of eleven years were

explored in the study. Since the study began in 2010, there have been a lot of international banks operating in the country. Banks on the Ghana Stock Exchange (GSE) are examined. For the purposes of this research, each listed bank was treated as a "Decision Making Unit," concerning how corporate governance impacts profit productivity (DMU). DEA-based Malmquist Indexes were used to rank the listed banks' performance and operational efficiency.

Limitation of the Study

Academic research is sometimes fraught with challenges; this study is no exception. To begin, the researcher encountered difficulties during the data collection process and using the Data Envelopment Analyzes (DEA) software. Further, due to the study's confinement to the offices of the Ghana Stock Exchange and the Ghana Bankers' Association's headquarters, numerous financial resources were required.

Organization of the Study

The study is divided into five chapters, each with its own set of sections and possible subsections. The first chapter discusses the study's context, problem statement, aims, questions, research contributions, and scope. Chapter two studies the pertinent literature on efficiency and productivity studies in banking to substantiate the research's goal and seek answers to research questions. Additionally, it provides an overview of the industry, its rules, and the organizational structure of the firms that operate within it. Chapter three discusses the research approach, outlining the primary nonparametric DEA and its expansions. Chapter four comprises the presenting of data, the analysis of outcomes, the administration of tests, and

the creation of graphical depictions. The concluding chapter discusses, summarizes, concludes, gives recommendations, and suggests future study directions.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The banking industry is analyzed in this chapter, along with its corporate governance, profit productivity, and efficiency. The theoretical underpinnings of corporate governance and the profit productivity of banks, as well as their practical implementations, were examined as well. The conceptual framework, review of relevant empirical literature, and theory all form part of this chapter's structure. The conceptual framework unites the study's theoretical and empirical underpinnings and guides the formation of research hypotheses.

Theoretical Review

This section of the study reviews the theoretical underpinning of the study. It consists of the theories that explain corporate governance and firm performance. It also describes how directors are considered the gatekeepers of the owners of firms and the directors' duties to the company they are managing. Thus, the review considered the agency theory, stewardship theory, and resource dependency theory.

Agency theory

The agency theory is a well-established theoretical foundation in corporate governance for directors' responsibilities in ensuring the company's success (Haw, Chu & Zhang, 2011). Management and shareholders face a conflict of interest because of the separation of corporate ownership and control, according to Jensen and Meckling (1976). When the primary owner realizes that management is making decisions not in their best

interests, notwithstanding the separation of administrative control and ownership, conflicts arise (Kingston & Weng, 2014).

Businesses exist solely to increase their owners' wealth; however, their operation in an uncertain environment makes them apply the agency hypothesis. Adverse selection and moral hazard are the results of these situations. Principals cannot tell whether agents honestly portray their competence to perform the paid work (Ben Ali, 2014). When a principal is not sure if an agent is doing all possible to serve the principal's interests, this is referred to as a "moral hazard" (Li & Wang, 2018).

According to the agency theory, managers have the edge over business owners since they have access to company data. Managers may be more concerned with enhancing their wealth than the company's owners' wealth because of the knowledge asymmetry created by separating management from ownership (Rahmawati et al., 2018; Triyuwono, 2018). Few internal control methods are critical for the corporate board, according to Fama and Jensen (1983b). According to the hypothesis, the board of directors is an essential instrument for assessing corporate governance's success, and this efficacy is correlated with board size, board diversity, and the significance of board committee structures.

Stewardship theory

The concept of good stewardship posits that an effective steward safeguards and enhances the wealth of shareholders. Stewards are the executives and administrators of a company entrusted with safeguarding investors' interests (Chrisman, 2019). The prosperity of the company leads to the satisfaction of these stewards, thereby fostering independent behavior

among employees and executives aimed at maximizing shareholder value. To realign the goals of the principal, corporate governance may modify the rules governing the agent (Adiguna, 2021).

The designation of an agent to act on behalf of a principal is aimed at leveraging the agent's expertise in company operations to compensate for the principal's lack of experience (Aiyappa, 2021). Crucially, for this arrangement to succeed, agents must be inclined to act in the principal's best interests. Agency theory comes into play here, enabling the design of incentives that consider the agent's preferences. Discouraging unethical behavior and implementing regulations to mitigate moral hazards are imperative. Identifying and rectifying the underlying causes of issues allows companies to enhance their policies (Strampelli, 2020).

The "agency loss" percentage is often used as a proxy for an agent's dedication to their principal. "Agency loss" refers to instances where the agent's actions fall short of the principal's expectations. For instance, an agent incurs no agency loss if they consistently prioritize the principal's interests. The extent of agency loss escalates when the agent's behavior deviates from the principal's interests (Kingston & Weng, 2014). Reforms in corporate governance laws have the potential to reinstate the principal's stake in a company. The appointment of an agent serves to alleviate the principal's concerns regarding their limited knowledge of the agent's work. Agents should prioritize the principal's interests over their own.

By employing agency theory, incentives can be structured in a manner that genuinely accommodates the agent's needs. Mechanisms that incentivize undesirable conduct need to be curtailed, necessitating the enactment of regulations to prevent "moral hazard." Pinpointing the

underlying causes of problems empowers companies to devise more effective solutions (Li & Wang, 2018). The metric of "agency loss" has become widely adopted to gauge an agent's commitment to the principal. "Agency loss" denotes situations where the agent's performance falls short of the principal's expectations. An agent who consistently upholds the principal's interests retains their status as an agent. However, if an agent's actions diverge from the principal's interests, the agency relationship deteriorates (Kloyer et al., 2018).

Resource dependency theory

The Resource Dependency Theory focuses on the function of board directors in facilitating access to the resources required by the firm. An organization's links to the external environment, according to the report, are critical to the director's function in obtaining or securing resources (Bhyrovabhotla, 2012). This approach emphasizes the board of directors' responsibilities in light of a company's reliance on the help of its directors. An organization's board of directors can assist in securing and maintaining essential resources (Gottschalk, 2012). According to the theory's explanations, an organization's board size and composition can help link it to specific critical resources.

There are many benefits to having members on a board who have outside influences, including the board performing a boundary-spanning function to "minimize operational uncertainty, decrease functional dependencies, promote information exchanges, enhance its reputation to various stakeholders, and enhance general productivity (Mugiati, 2015). Thus, the resource dependence theory asserts that a firm's external resources

must be linked to the firm's internal resources by appropriating the resources required for survival, directors association the company and the outside world (Grosvold et al., 2015).

Conceptual Review

Ghana's perspective of corporate governance

In contrast to the United Kingdom and the United States, the Republic of Ghana lacks a unified, comprehensive framework for regulating corporate governance. Unlike financial reporting rules, there is no consistent set of corporate governance standards. The Corporations Code, for instance, mandates that all businesses adhere to a set of corporate governance principles and practices. This includes regulations about the number of directors, their responsibilities, remuneration, dismissal, and shareholders' ability to convene meetings (Agyemang & Castellini, 2015).

However, certain corporate governance aspects such as the composition of the board, the distinction between executive and non-executive members, or the formation of board committees, are not covered by the Code (Ogeh & Fiador, 2013). These supplementary corporate governance practices are dealt with in other legislation that specifically addresses them. For publicly traded companies, the Securities and Stock Exchange Rules and Businesses Code stipulate adherence to corporate governance standards outlined in the Securities Industry Law of 1993 (amended in 2000), the Securities and Exchange Commission Regulations of 2003, and the GSE Listing Regulations of 2004, among other regulations. For instance, all publicly traded firms are required to establish audit committees, composed entirely of independent members. The chairperson of the audit committee must be a non-executive director, and all committee

members must possess a certain level of financial expertise (Botchway & Ewurabena, 2021).

Furthermore, Ghana has voluntary corporate governance guidelines such as the Ghana Manual on Corporate Governance, published by the Private Enterprises Foundation (PEF) and the Institute of Directors (IOD), and the SEC Guidelines on Best Corporate Governance Practices issued by the Securities and Exchange Commission (GCGP). A significant portion of the SEC's guidelines are based on the criteria established by the OECD (Botchway & Ewurabena, 2021).

However, these voluntary standards are not widely adopted in Ghana and are seldom fully followed. This is not surprising considering that even the country's statutory regulations are frequently violated (World Bank, 2005). According to the World Bank, robust corporate governance entails safeguarding essential shareholder rights, establishing proper standards for annual general meetings (AGMs), ensuring equitable treatment of shareholders under the law, and providing timely information in annual reports (World Bank, 2005). Yet, there is a lack of an overarching framework guiding the development of corporate governance standards.

Consequently, corporate governance practices in Ghana face several critical challenges, including the absence of standards to ensure board independence, inadequate enforcement mechanisms, insufficient disclosure requirements, and inconsistencies between merger-related stipulations in Ghana's Companies Code and SEC regulations (World Bank, 2005). Hence, a comprehensive set of corporate governance standards is imperative in Ghana to rectify the country's low level of corporate governance.

Additionally, granting regulators more authority to enforce compliance is vital to enhance adherence to current corporate governance mandates.

Empirical Review

This section of the research looks at previous studies relating to corporate governance, bank profitability, and profit productivity and the formulation of hypotheses that help the examination answer the study's research questions. Thus, the section is structured as

An evaluation of the banking sector's productivity

The rate at which a product can be produced per unit is productivity. According to Daraio and Simar (2007), productivity refers to an organization's capacity to increase output while minimizing input costs at a specific production level. Academics evaluated the productivity and efficiency of decision-making units (DMUs) by using the production cost or profit frontier to establish a DMU's productivity and efficiency in a parametric strategy (Onyeukwu & Edet Ekere, 2018; Ozigbu, 2018; Singh, 2017). A non-parametric of productivity analysis known as Data Envelopment Analysis (DEA); which uses cost of production or profit margin to evaluate DMUs' productivity and efficiency (Paço & Pérez, 2013; Dorri & Rostamy-Malkhalifeh, 2017; Reshadi, 2014).

DEA and the Malmquist Productivity Index (MPI) are two increasingly popular methods for evaluating productivity. DEA with MPI has been used in several studies, particularly in the banking industry, to assess DMU productivity and efficiency (Henriques et al., 2018; Jiang & He, 2018; Kamarudin, Chiun et al., 2017). The overall factor productivity of 53 Indian banks from 1992 to 2018 was studied using the DEA with MPI (Thota &

Subrahmanya, 2019). Productivity convergence was higher in public banks than in international and private banks (Thota & Subrahmanya, 2019). From 2000 to 2014, DEA and MPI were employed by Mansour and Moussawi (2018) to investigate productivity and efficiency in several banks in the Arabian countries. In terms of technical efficiency, it was 13%, allocative efficiency was 21%, and cost efficiency was 30%. In terms of overall productivity, MPI saw a 2.44%.

Overall factor productivity change by MPI was not broken down to establish which factors were responsible for increasing total productivity (Moussawi, 2018). Suzuki and Sastrosuwito (2011) and Anwar (2012) conducted comparable studies using the SFA and Tobit regression to evaluate the cost-effectiveness of Indonesian banks. Banks' average cost efficiency decreased during the period, but researchers could not identify a specific decrease case.

Further, the European banks' productivity has been examined using MPI in each of three crises: the subprime mortgage crisis in 2007–2008, the global financial crisis in 2009–2010, and the sovereign debt crisis in 2011–2012 (Gerhardt & Vennet, 2016). During the subprime crisis in 2007-2008, production surged; but, during the global financial crisis in 2009-2010 and the sovereign debt crisis in 2011-2012, production declined (Gerhardt & Vennet, 2016). The study, however, did not break down the sovereign debt crisis, global financial crisis, and subprime period improvements into technical and technological changes. This study ensures integrating the productivity change, technical change and technological change to ascertain the cause of each stage.

Using data from 2012 to 2016, Henriques et al. (2018) examined the CCR and BCC models in the Brazilian banking sector. The CCR model had an average efficiency score of 51.4%, whereas the BCC had 69.8% based on a survey of 37 institutions. To measure the effectiveness and productivity of seventeen of China's publicly traded banks, Jiang and He (2018) employed the DEA – MPI method between 2012 and 2017. Twelve banks increased technical efficiency, three stayed the same, and two saw a 1% decrease. This led them to believe that the DMUs were becoming more efficient and productive. Also, Vietnamese banks were studied using CCR and BCC DEA models with bootstrap regressions between 1999 and 2009. (Stewart et al., 2016). Performance and efficiency go up when the size of the bank increases. Likewise, Yilmaz and Gune (2015) looked at Islamic banks in Turkey from 2007 to 2013 for their pure technical performance. Some Islamic banks are less efficient than others. According to Sufian (2011), rather than inefficiency, the decline in Malaysian banks' efficiency was primarily due to technological deterioration.

Research on banking efficiency and productivity in Africa is scarce. South Africa, Ghana, Nigeria, and Kenya are countries where much have been done. The performance of 40 Kenyan commercial banks from 1997 to 2009 was examined by Kamau (2011) using DEA with MPI. The absence of economies of scale and the slow pace of technological innovation was cited as the main reasons for the banking industry's inefficiency (Kamau, 2011). South Africa's four largest banks saw productivity declines due to the global financial crisis of 2008 and non-performing loans (Maredza & Ikhide, 2013). Despite this, factors including bank size, non-interest revenue, and operational efficiency have contributed to increasing total factor

productivity. The study was conducted between 2000 to 2010, and bank data was subjected to the Hicks-Moorsteen Index (Maredza & Ikhide, 2013).

A recent study on bank productivity in Africa by Nartey et al. (2019) found that technological stagnation was the leading cause. This research did not explore technology's impact on overall bank productivity. Biennial MPI with regression analysis was utilized on 120 banks from 24 African countries between 2007 and 2017. As Kamau (2011) found in Kenya, these results are consistent.

According to a study conducted in Ghana, profit growth has nothing to do with a bank's location, size, operating costs, or profitability ratios (Isshaq & Bokpin, 2012). Predicting efficiency scores using SFA is thought to be unrealistic compared to DEA, which makes simultaneous use of many inputs and outputs. From 1999 to 2007, 26 commercial banks in Ghana were evaluated using SFA (Isshaq & Bokpin, 2012). According to the findings, banks owned by foreigners were less expensive than those controlled by locals. However, foreign banks may not always be the most profitable (Isshaq & Bokpin, 2012). The technical and scale efficiency of Ghana's 16 universal banks was evaluated by Akoena, Aboagye, and Antwi-Asare (2013) using DEA between 2000 and 2006. According to the research, a higher efficiency rate of 98% was observed in smaller banks than larger ones (Akoena et al., 2013).

Banks' profit-oriented efficiency and productivity

Technological efficiency and productivity, along with cost and revenue efficiency and productivity, have been emphasized in nearly all recent studies of banks' efficiency and productivity. Several studies (Nahm & Vu 2013; Juo et al. 2016; Restrepo-Tobón & Kumbhakar, 2017; Restrepo-

Tobón & Sánchez-González, 2018) have analyzed the profitability-driven effectiveness of banks. From 2000 to 2006, Nahm and Vu (2013) analyzed the effectiveness and output of 56 Vietnamese banks. As a result of technological development and technical efficiency, they found that Vietnamese banks experienced a moderate productivity growth (Nahm & Vu, 2013).

However, scale efficiency hinders productivity advancements. It was also shown in the research that minimum capital requirements and deposit taking limits imposed by central banks had a negligible effect on banks' productivity growth (Nahm & Vu, 2013). In contrast to Nahm and Vu (2013), Juo et al. (2016) used the Slack-Based Measurement (SBM) method to assess profit productivity. Aside from using inputs and outputs that define banks' total income and total expenses, this analysis did not account for exogenous factors that contributed to the growth in profit productivity (Juo et al., 2016).

Using information from the US banking sector between 2000 and 2010, Restrepo-Tobón and Kumbhakar (2017) showed that total profit efficiency results from revenue and expense efficiencies. Overall efficiency in generating profits was calculated at 96.5%, with the remaining 3.5% attributable to inefficient use of resources (mostly a 1% drop in revenues and a 2.5% increase in expenses). Profit and productivity were also shown to be directly related to the degree to which income and expenditures were optimized. Technological progress and improvements in technical efficiency may affect bank output (Restrepo-Tobón & Kumbhakar, 2017), but these factors were not considered in the study.

For the period between 2001 and 2013, Restrepo-Tobón and Sánchez-González (2018) assessed the revenue and cost efficiencies of banks in

Colombia to determine their profit efficiency and profit productivity. The method avoids the problems of misspecification that plague the traditional non-standard profit function (Restrepo-Tobón & Sánchez-González, 2018). Revenue efficiency improvements were found to have boosted profits and productivity. As with Restrepo-Tobón and Kumbhakar (2017), Restrepo-Tobón and Sánchez-González (2018) found a correlation between cost and revenue efficiency and profitability and productivity. In this analysis, we focused on the banks that are traded on the Ghana Stock Exchange to determine how corporate governance affects their productivity.

H_1: efficiency and effectiveness of inputs and outputs of listed banks are positively correlated with the profit productivity of Ghana's publicly traded banks.

In recent decades, assumptions centred on banking literature have been developed to justify differences in efficiency and productivity between internationally and domestically incorporated banks (Avkiran & Zhu, 2013; Bacovic, 2021; Chaffai, 2021). When comparing the productivity and competitiveness of domestic banks to their overseas counterparts, the economies of countries where the banks operate has a significant impact on these comparisons. Host or domestic banks in developed economies are more competitive than foreign banks. On the other hand, foreign banks tend to fare better in emerging economies than domestic banks (Alnaa et al., 2016; Bouzgarrou et al., 2018).

Profit productivity of multinational and local banks in France's financial industry was researched by Bouzgarrou et al. (2018) between 2000 and 2012, as well as the years leading up to the 2008 financial crisis. The

performance of international banks was generally better than that of local ones, with the exception of those based in industrialized nations. Return on assets, return on equity, and net interest margin were used as surrogates for profitability across 105 domestic and 65 international banks in the study. Additionally, the robustness test verified that overseas banks profited from lower profit productivity than domestic ones (Bouzgarrou et al., 2018). Chinese researchers Luo et al. (2015) confirmed the findings of Bouzgarrou et al (2018). They compared the proximity of rival financial institutions using a foreign bank branch index. For the three types of commercial banks in China's banking industry, the index ranked foreign banks better than local ones due to their superior profit productivity and banking efficiency (Luo et al., 2015).

Saif-Alyousf et al. (2017) evaluated local and foreign Saudi Arabian banks using pooled OLS and fixed-effects models between 2000 and 2014 to determine their efficiency and profitability. They found that banks performed better than those from other countries (Saif-Alyousf et al., 2017). Due to foreign banks' riskier investment portfolios, domestic banks could not keep up with them. According to the study, the operation and administrative expenditure of the international banks were statistically significant but inversely associated with profitability (Saif-Alyousf et al., 2017).

Bopkin (2013) shows that overseas banks are more cost-effective than local banks, but foreign banks are not necessarily superior to local banks in profit efficiency, as previously reviewed. Furthermore, in his research on Ghanaian banks, he found significant disparities in the structure, methods,

and economies of scale between international and domestic banks in terms of cost and size (Bopkin, 2013).

According to Chen and Liao (2011), foreign banks performed better than domestic ones in less competitive markets, whereas local banks outperformed foreign ones in more competitive markets. A cross-country survey of 70 nations from 1992 to 2006 spanning emerging and established economies yielded the above. It also was proven by Cull et al. (2017) that foreign-owned banks in countries and other emerging economies have a more remarkable ability to create liquidity, maintain financial stability and perform better than domestically-owned banks. During economic distress, foreign banks usually received financial cousins from the parent companies in their native country.

The impact of foreign ownership on Nigerian banks' performance was studied by Jinadu et al. (2018), who looked at data from 2010 to 2014. Research shows that ownership has a significant, but negative, effect on a company's performance. Jinadu et al. (2018) advocated for opening up the Nigerian banking system to foreign banks. The efficiency of both foreign and domestic banks would benefit from less concentrated ownership.H_2: Ownership structure of listed banks is positively correlated with the profit productivity of Ghana's publicly traded banks.

Relationship between board size and profit productivity

Every business is governed by a board of directors, which is in charge of making all of the company's significant decisions and managing all of the company's operations and finances (Abeysekera, 2010; Yang et al., 2020). Because of the board of directors' responsibilities, the composition of the

board of directors is crucial in any organization's governance structure. Increased board size is connected with improved corporate governance and higher earnings, both of which are related to the size of the board of directors. As a result, researchers have attempted to identify the optimal size of a company's board of directors (Wu et al., 2018).

Having a large number of influential people on your board has been linked to increased productivity. In certain cases, there is no obvious link between board value and performance, making it hard to draw any conclusions from these figures. It has been argued by some academics that the size of a bank's board of directors has a favorable influence on the institution's performance relative to a given metric (Bokpin, 2013; Hsu & Petchsakulwong, 2010; Olson, 2000).

Chiang and Lin discovered that, contrary to the findings of Tian and Twite (2011), the size of a company's board of directors negatively affects aggregate factor productivity in the manufacturing industries. Despite the potential importance of these findings, no one has systematically examined the relationship between board size and shifts in profit-oriented production. Also, Guest (2009) used primary and secondary data to show a sizable sample of UK businesses from 1981 to 2002, with both descriptive and inferential results. In this study, we found that a larger board negatively affects profitability, Tobin's Q, and share returns. In another important research, Cheng (2008) used a sizable sample of American businesses operating between 1996 and 2004 to find that companies with more members of the board of directors also had lower annual profitability as measured by financial reporting returns on assets.

It has been shown that board size does not impact company profitability in South Africa by Mangena and Chamisa (2008). Based on an analysis of secondary and primary data collected from 81 publicly traded companies from 1999 to 2005, the authors conclude that the size of a company's board has no bearing on the firm's profitability, as measured by operating profits and capital investment employed. As a result, it may be concluded that the size of the board and the profitability of public companies have no meaningful relationship.

Alabdullah et al. (2018) assert that boards with more than seven members may be ineffective in their decision-making processes. According to the study, larger boards of directors result in weaker communication, coordination, and decision-making because CEOs can alter their composition (Alabdullah et al., 2018). These disagreements and exchanges between and among board members result from a large number of board members (LeRoux & Langer, 2016). Given the claims of the resource dependence hypothesis as well as the findings of the great majority of studies, it is plausible to assume the following:

H_3: The board of directors′ size has a considerable favourable effect on the profit productivity of Ghana's publicly traded banks.

Relationship between board diversity and profit productivity

The majority of earlier literature has concentrated on the gender viewpoint of diversity, emphasizing the critical need of having more women on boards of directors (Luanglath et al., 2019). Wicker et al. (2020) suggest that the gender mix of the board can affect the quality of the board's monitoring role. They argue that women demonstrate high values within and

without the organization, affecting its exceptional productivity (Luanglath et al., 2019; Wicker et al., 2020; Nguyen et al., 2015).

According to studies, corporations with prominent female executives generate much more money, and women on boards increase profitability and shareholders' value (Mustika & Isnalita, 2019; Mobbs et al., 2021; Alluwia & Sarun, 2018). The resource dependency theory claims that businesses can gain better transparency by having sufficient female directors, resulting in a firm's competitive advantage (Green & HomRoy, 2017; Ararat & Yurtoglu, 2019). Female directors, it is argued, contribute to a firm's competitive edge in two ways: they are seen as being more independent because they do not engage in any "old boys' network," and second, because they have a better understanding of consumer requirements and behaviour (Adams & Ferreira, 2009).

Previous research established the case for a more gender-diverse board relationship between board diversity and business performance, as it is far more convoluted and contributes immensely to the productivity of corporate entities. As a result, the literature on the influence of board gender diversity is equivocal, and these studies examine its relationship to banks' profit-oriented productivity. Consistent with theories of resource dependency and agency, the study postulates the following:

H_4: Board diversity is positively correlated with the profit productivity of Ghana's publicly traded banks.

When an employee or director is compensated based on the company's stock value, they are receiving "equity-based remuneration" (Paul, 1992). Interest in linking top leadership compensation to the

company's stock price has gone up dramatically among both research and professional groups as a means of matching management and shareholders' interests (Paul, 1992). Yamoah (2013) contends that business managers are self-interested persons and risk-averse because of the agency theory. The inference is that management wants their remuneration to be structured in a way that minimizes their personal risk. Therefore, managers would prefer equity-based remuneration over regular monetary rewards at any level of managerial salary (Boulton et al., 2014; Pyo, 2017; Ryabkov, 2014). Since the value of managing human capital varies with the company's value, equity-based pay is strengthened because it is related to the return on shares of a company and, therefore, cannot be determined by the managers.

Corporate executives may take actions that reduce the firm's risk to reduce their own risk of equity remuneration, negatively impacting shareholders' equity (Boulton et al., 2014). Because shareholders tend to be risk-averse, it's safe to assume that they will be aware if management attempts to minimize hazards that could have a negative impact on the company's performance. Although there are different ways to decrease disagreement over risk, the literature suggests that connecting executive compensation to corporate value leads managers to adopt decisions that maximize the organization's value (Ryabkov, 2014; Chung et al., 2015; Ntim et al., 2013). Executive compensation can also be tied to the company's worth by making a more considerable percentage of executive compensation share-based, such as through share-based payment and executive stock options (Zheng & Zhou, 2011). Research has shown that managers are more willing to take risks when incentive-compensation plans are in place (Arnold, 2013). This is why, even if compensation levels remain the same, shareholders

would prefer a higher form of equity-based remuneration for managers, even though it may be inefficient to connect all compensation components to the price of a company's stock.

According to Lazonick (2016), CEO pay and stock options have a significant beneficial impact on a company's value, as evaluated by Tobin's Q. Recent researches have verified this, finding that stock remuneration has a direct impact on organizations' performance (Chen & Jermias, 2014; Ntim, Lindop, Osei, & Thomas, 2015). Executive salary and stock options have not yet been studied concerning banks' productivity. It is hypothesized, based on results from previous research, that:

H_5: Share-based remuneration as a kind of equity-settled compensation positively affects the productivity of Ghana's listed banks.

Conceptual Framework

A conceptual framework explains the expected outcomes of the inquiry. It defines the parameters relevant to the investigation and displays their possible relationships. Prior to beginning data collection, a researcher must construct a conceptual framework (Zeidan & Itani, 2020). The researcher developed the study's conceptual framework using existing literature on corporate governance and bank profit productivity. The conceptual framework presumed that for the profit productivity of banks, inputs are used to generate outputs. Thus, the inputs are interest expenses, remuneration of employees and other operating expenses. The output generated by banks is mainly income made up of interest income and Other Operating Income. The framework presumed that in addition to the effective and efficient management of input and output, corporate governance

variables and ownership structure could also influence the profit productivity of banks. Thus, the basis of the current conceptual framework of the study. The frame below depicts the proposed conceptual framework of the study.

Conceptual Framework

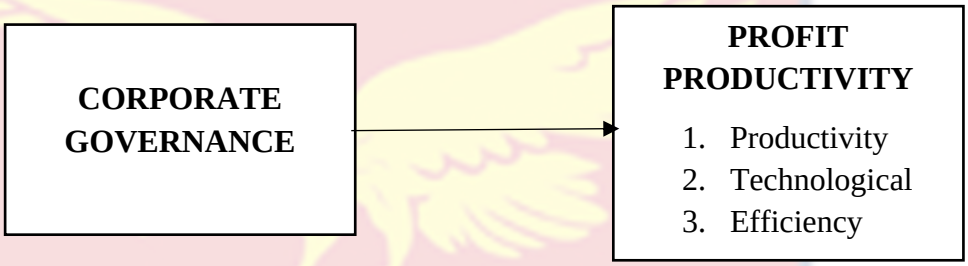

Figure 1: Conceptual Framework

Source: Authors' Construct (2022)

Chapter Summary

The chapter addressed the literature on theoretical, conceptual and empirical concerns linked to corporate governance and Banks' profit productivity in Ghana. Important concerns and insights from the review informed the conceptual framework of the study. The review will further prove valuable in the methodology, analyses, presentation of findings, debates, conclusions and suggestions. The next chapter provides the technique utilized to carry out this investigation.

CHAPTER THREE

RESEARCH METHODS

Introduction

The chapter describes the appropriate research methodologies for achieving the study's objectives. It addresses the research strategy, data source, data analysis procedures, econometric model, and variables employed.

Research Approach

Designing this study is all about the approach, methodology, and processes that would ensure a successful outcome (Churchill & Icacobucci, 2005). It is the primary goal of the design to ensure that the data collected order to address the research question in a clear and precise manner. For the analysis, it specifies the model to be used and the method used to select models. A balanced panel research method was used in this study because the data obtained may be used to draw conclusions about the population as a whole (Lavrakas, 2008).

This analysis employed a non-parametric approach known as Data Envelopment Analysis (DEA). The output-oriented methods of the CCR and BCC models, as well as the Malmquist Productivity Index, were used to evaluate the efficiency and productivity of the listed banks while focusing on their corporate governance practices. In effect, this study generalized the findings to the entire banking industry utilizing the CCR and BCC models of DEA and the banks' MPI to measure production based on the corporate governance variables employed by the listed banks. The profitability technique was chosen since it allowed for the determination of the best output

maximization for a given the amount of inputs when the corporate governance elements at the banking sector are held in higher esteems.

The research approach could center on the relevance of hypotheses to the examination of profit productivity and corporate governance functions at the industry's selected banks. The logical nature of the research approach ensures the validity of the underlying assumptions and hypotheses.

Research Design

According to Bryant (1985), Positivism is a scientific knowledge that is reliable because it emanates from positive affirmation of theories through rigid scientific methods (techniques for examining occurrences is based on gathering observable, empirical and measurable evidence subject to specific principles of reasoning). One of the fundamental concepts underlying positivism is the logic of enquiry which goes across all sciences (social and natural sciences). Inquiry takes the shape of three primary sorts of research designs.

These include; Explanatory design, Exploratory and Descriptive research design (Yin, 1994). Exploratory research design is the most valuable and or appropriate research design for projects or studies that seeks to address the subject which has associated high level of uncertainties and ignorance about the subject matter, and that when the problem under study is not very well understood or that the subject matter has very little existing research on it. Such research is generally characterized by a high amount of flexibility but lacks a systematic structure. The basic objective of exploratory research is to determine the limits of the environment in which the issues, the

opportunities, and or the situations of interest are likely to be located and to examine the salient features or variables that could be disclosed (Yin, 1994).

In the perspective of Yin (1994), the major purpose of the descriptive research design is to produce an accurate and valid depiction of the aspects or variables that apply to studies and are more structured than exploratory research. Explanatory research design on the other hand is also referred to as analytical investigations. It aims to find any causal relationships between the components or variables that pertain to the study topic. Such research is likewise quite regimented in nature. For the aim of this investigation, the descriptive research design approach was chosen for the study.

Study Area

Listed banks in Ghana are financial institutions that have gone public and are traded on the Ghana Stock Exchange (GSE). These banks, through their listing status, benefit both the economy and themselves. They offer avenues for individuals and institutional investors to participate in the ownership of these financial entities, thereby promoting broader wealth distribution and financial inclusion. Additionally, being listed enables banks to raise capital from the public markets, facilitating expansion, innovation, and improved service delivery.

Population

The population of a study is the collection of materials, objects, organisms, substances, and cases examined in the study (Sparks & Joyner, 2019). The population of this study is all the eight (8) listed banks on the Ghana Stock Exchange operation banking services in the country.

Sampling Procedure

Sample size referred to the number of elements or items actually selected from the population of a study on which data is collected for the purpose of a study. An examination is frequently limited to one or more samples selected from it the population. While a well-chosen sample will include the majority of information about a given population parameter, the relationship between the sample and the population must be such that reliable inferences about the population may be drawn from the sample.

The sample size for this study is Access Bank Ghana Plc, Agricultural Development Bank, CalBank PLC, Ecobank Ghana Ltd, Ghana Commercial Bank Limited, Republic Bank (Ghana) PLC, Standard Chartered Bank Ghana Ltd., and Societe Generale Ghana Limited. These banks are selected for the study as they are the listed banks on the Ghana Stock Exchange (www.gse.com.gh).

Table 1: Study Organisations

Ghana Stock Exchange Listing
Access Bank Ghana Plc
Agricultural Development Bank
CalBank PLC
Ecobank Ghana Ltd
Societe Generale Ghana Limited
Ghana Commercial Bank Limited
Republic Bank (Ghana) PLC
Standard Chartered Bank Ghana Ltd.

Source: Field survey (2022)

Data Source

Secondary data on the Ghana Stock Exchange-listed banks operating in the country was obtained from the Ghana Stock Exchange's website and

cross-validated against Bank of Ghana (BOG) records, as well as additional data from Ghana Banking Surveys from 2010 to 2020, resulting in an 11-year annual bank-level data set. This year bracket was used due to the availability of data and its' readiness to be used for the study. The study employed DEA – MPI to compare the efficiency and productivity of banks in addition with corporate governance variables that are expected to boost the productivity of the selected banks over the period of the study (2010 to 2020).

Data Envelopment Analysis with Malmquist Productivity Index (DEA – MPI)

The current study used Data Envelopment Analysis (DEA) in combination with the Malmquist Productivity Index (MPI) to determine the profit productivity of the Ghana Stock Exchange-listed banks. DEA is a non-parametric approach that makes no functional inferences or assumptions about the data it analyzes. Additionally, it has no error, implying the absence of an unobserved variable term. The technique is used to assess bank effectiveness and efficiency because it treats each bank in the industry as a decision-making unit (DMU) and compares its efficiency to that of the best performing DMU (Jiang & He, 2018). Furthermore, DEA permits the multi-input and output of a DMU that measures efficiency and performance, eliminating the requirement to assign a model to any production function. As a result, the causes of inefficiency may be easily detected using their efficiency score, and techniques for improving a DMU's efficiency can also be defined (Repkova, 2014).

Another critical advantage of DEA over accounting ratios and SFA is that its functional form is established based on empirical data rather than

conceptual evidence, increasing the chance of integrating more inputs and outputs at various stages (Svitakova, 2014). Combining DEA and MPI models might yield a good result for estimating the productivity and efficiency of DMUs (individual banks). Additionally, the DEA approach compensates for the absence of accounting indicators for measuring efficiency (Tuskan & Stojanovic, 2016). This simplifies and popularizes the procedure for research purposes.

Assume that the technical efficiency of DMUs is defined as the ratio of output to input. Thus, n number of DMUs is denoted by $DMU_j = (j = 1, 2, 3, \dots\dots\dots\dots n)$, where each DMU has m inputs and q outputs denoted by $x_s = (s = 1, 2, 3, \dots\dots m)$ and $y_r = (r = 1, 2, 3, \dots\dots q)$ respectively. If each input and output are weighted by $v_s = (s = 1, 2, 3, \dots\dots m)$ and $u_r = (r = 1, 2, 3, \dots\dots q)$ then, the equations of the input-oriented and the output-oriented model of the DEA is stated below as:

$v = v_1x_1 + v_2x_2 + v_3x_3 + \cdots + v_mx_m$ …….. (1) denoting weighted input

$u = u_1y_1 + u_2y_2 + u_3y_3 + \cdots + u_qy_q$ …….. (2) denoting the weighted output

If the bank whose ratio of output to input to be measured is denoted by $DMU_,$ then

$$DMU = \frac{u_1y_1+u_2y_2+u_3y_3+\cdots+u_qy_q}{v_1x_1+v_2x_2+v_3x_3+\cdots+v_mx_m} = \frac{\sum_{r=1}^{q} u_ry_r}{\sum_{s=1}^{m} v_sx_s}$$

…… (3)

$where\ v \geq 0\ and\ u \geq 0, for\ s = 1, 2, 3, \ldots, m\ and\ r = 1, 2, 3, \ldots. q.$

Therefore, the model based on constant returns to scale is given as

$$DMU = \frac{\sum_{r=1}^{q} u_r y_r}{\sum_{s=1}^{m} v_s x_s} \qquad (4)$$

$$s.t. \frac{\sum_{r=1}^{q} u_r y_{rj}}{\sum_{i=1}^{m} v_s x_{sj}}$$

$where\ v \geq 0\ and\ u \geq 0, for\ s = 1, 2, 3, \ldots, m;\ \ r = 1, 2, 3, \ldots. q\ and\ j = 1, 2, 3, \ldots. n.$

On the other hand, the Malmquist Productivity Index is calculated by comparing the Total Factor Productivity (TFP) of DMU with diverse inputs and outputs over two unique periods. The Malmquist index is a geometrical average of a set of productivity indicators that quantify the difference in production between two time periods $k\ and\ (k+1)$, with regard to the technology of the period k (Caves, Christensen & Diewert, 1982).

$$M_0^k(X_{k+1}, Y_{k+1}, X_k, Y_k) = \frac{D_0^k(X_{k+1}, Y_{k+1})}{D_0^k(X_k, Y_k)}, \qquad (5)$$

and when the production in the period $(t+1)$, the production function becomes

$$M_0^{k+1}(X_{k+1}, Y_{k+1}, X_k, Y_k) = \frac{D_0^{k+1}(X_{k+1}, Y_{k+1})}{D_0^{k+1}(X_k, Y_k)} \qquad (6)$$

If $M_0 > 1$, it is an indication that productivity in period k is higher than productivity in$(k+1)$.

To eliminate arbitrary period selection, Fare, Grosskopf, Norris, and Zhang (1994) reformulated the production function that integrates the Malmquist Productivity indices in both eras. The New Index is as follows:

$$M_0(X_{k+1}, Y_{k+1}, X_k, Y_k) =$$

$$\left[\left(\frac{D_0^k(X_{k+1},Y_{k+1})}{D_0^k(X_k,Y_k)}\right)\left(\frac{D_0^{k+1}(X_{k+1},Y_{k+1})}{D_0^{k+1}(X_k,Y_k)}\right)\right]^{\frac{1}{2}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

This is also referred to as the geometric mean of output for the two periods based on MPI. As a result of equation (7), it is possible to deduce that

$$M_0(X_{k+1}, Y_{k+1}, X_k, Y_k) =$$

$$\left(\frac{D_0^{k+1}(X_{k+1},Y_{k+1})}{D_0^k(X_k,Y_k)}\right)\left[\left(\frac{D_0^k(X_{k+1},Y_{k+1})}{D_0^{k+1}(X_{k+1},Y_{k+1})}\right)\left(\frac{D_0^k(X_k,Y_k)}{D_0^{k+1}(X_k,Y_k)}\right)\right]^{\frac{1}{2}} \ldots\ldots\ldots\ldots (8)$$

Where $\left(\frac{D_0^{k+1}(X_{k+1},Y_{k+1})}{D_0^k(X_k,Y_k)}\right)$ measures the relative technical efficiency between the two periods, $k\ and\ (k+1)$ and $\left[\left(\frac{D_0^t(X_{t+1},Y_{t+1})}{D_0^{t+1}(X_{t+1},Y_{t+1})}\right)\left(\frac{D_0^t(X_t,Y_t)}{D_0^{t+1}(X_t,Y_t)}\right)\right]^{\frac{1}{2}}$ measures the technological changes between the two periods estimated at (X_k, Y_k) and (X_{k+1}, Y_{k+1}).

Model Specification

The DEA employs a variety of methodologies to assess efficiency in the banking industry, which views banks as institutions that provide services to their customers. It is established that banks use inputs such as human labor and other assets to deliver services to their clients, such as accepting deposits and issuing credit facilities (Tuskan & Stojanovic, 2016). Thus, the profit productivity model views banks as institutions whose profits are determined by the gap between their revenue and expenses. As a result, they treat expenditure as an input and revenue as an output.

The output-oriented approach established efficiency trends and laid the groundwork for evaluating the banks with the best performance. Tuskan and Stojanovic (2016) state that all expenditures would be considered inputs and all revenue-generating factors will be regarded outputs. This study adopted this approach by considering all expenditure of the listed banks as their inputs and all the revenue generated as their output. The study, therefore, used Interest expenses (x_1), Wages and Salaries (x_2) and operation expenses (x_3) as the input variables and interest income (y_1), Net Operating Income (y_2)as the output variables (Jiang & Yifan, 2018; Henriques et al., 2018; Tuskan & Stojanovic, 2016; Dauda et al., 2016, Agbemakor; 2019). The variables are explained as followed:

Interest expenses (x_1): It is the cost borne by a bank as a result of utilizing another bank's or financial institution's financial resource. Thus, it is the interest charged by a bank on borrowed funds.

Wages and Salaries (x_2): The spending on or investment in human capital is the input used to operate banks.

Operation expenses (x_3): This is the primary expense incurred in the bank's day-to-day operations. It is primarily composed of administrative costs.

Net Operating Income (y_2): It is the profit generated by the banks' operations. It is the bank's overall profit after interest and taxes have been removed.

Interest income (y_1): It is the amount of interest that a bank receives on the loans that it makes to its customers.

At the second stage, the study could use multi-level regression of pooled OLS, random effects model and fixed effects model which could

regress the banks profit productivity (return on assets and return on equity) on productivity change of the listed banks (using Malmquist Productivity Index) and corporate governance variables.

$$\Delta MPI_{it} = \beta_0 + \beta_1 BSIZE_{it} + \beta_2 BDIV_{it} + \beta_3 EXEC_{it} + \beta_4 FSIZE_{it} + \beta_5 FLEV_{it} + \beta_6 PCNI_t + +\varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots (9).$$

Table 2: Variables and their Description

Variables	Description	Measurement	Empirical Application
Corporate Governance Variables			
BSIZE	Board Size	Number of Board of directors	Hemphill and Cullari (2014); Choe (2011); Bokpin (2013); Zelenyuk and Zheka (2006)
BDIV	Board member diversity	Proportion of female directors on Board	Kumar and Zattoni (2016); Marquardt and Wiedman (2016); Adams and Ferreira (2009)
EXC	Executive Share Compensation	Proportion of share payments relative to the total emolument of directors	Arnold (2013); Nabilah Nur Alisha Ansar et al., (2021); Bhargava, (2011)
Control Variables			
FLEV	Financial Leverage	Proportion of total liabilities to total assets	Karo-Karo and Ginting (2020); Ilyukhin (2015); Vithessonthi and Tongurai (2013)
FSIZE	Firm Size	Natural log of total assets	Jreisat et al., (2017); Klien and Weill (2019); Tetteh-Amemei, (2014); Obamuyi (2013); Naceur and Omran (2011).
PCNIN	Growth in Banking Operations	Percentage change in net interest income	Jreisat et al., (2017); Klien and Weill (2019); Tetteh-Amemei, (2014); Obamuyi (2013); Naceur and Omran (2011).

Source: Field survey (2022)

Data Analyzes Procedure

For the initial step of analysis, the study used the MaxDEA 7 software. This program enables the study to conduct DEA using both the CCR and BCC models. It allowed the researcher to calculate the scale efficiency of each DMU in addition to the technical and pure technical efficiency calculated using the CCR and BCC models. Additionally, it includes the Malmquist Productivity Index. As a result, measuring the change in total factor productivity between pre- and post-capitalization was accomplished quickly. In the second stage, linear regression was performed using Stata Edition 14. It enabled the study to conduct diagnostic tests to ascertain the linear regression model's reliability and fitness.

Ethical Consideration

Plagiarism is the ethical dilemma that the majority of academic studies face. With that in mind, this research ensures that such difficulties be avoided to the greatest extent possible. Any content borrowed from other publications is acknowledged and credited. It is critical that no information or data obtained is manipulated in order to affect the conclusion of the findings or the data used to analyze the findings. According to the study's methodology, information regarding all banks used has been stated explicitly. The study, however, did not consider this to be an ethical concern because these pieces of information are always available upon request to anyone who wishes to use them. As a result, disclosing the actual identities of the institutions would have no adverse effect on the reputation of the banks employed in this study.

Chapter Summary

The research methodologies utilized to reach the study's aim were discussed in this chapter. It focused on the major parts of research methodology, such as the research strategy, population, sampling procedure, and data collection instrument. Because of the study's quantitative nature, a descriptive survey design was adopted. Also, to answer the study's research issues, descriptive and inferential statistical techniques such as percentages, frequencies, means, standard deviations, and STATA were utilized to evaluate the data.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter begins with descriptive statistics on the input and output variables of eight (8) banks listed on the Ghana Stock Exchange between 2010 and 2020. In addition, each of the applicable variables is described in detail here. In addition, the study's objectives are presented in a manner that is consistent with the display of the results. In addition, discussions are provided to validate previously established empirical and theoretical reasons.

Description of the Variables

In the first stage of the analysis, the measures of central tendencies and associations that were used include the following: means, medians, minimums, maximums, and standard deviations of the input and output variables. These values are presented in Table 2, which can be found further down on this page. The information concerning the eight (8) banks came from the various banks' published financial statements from the years 2010 to 2020. This information was then checked using the database of the Ghana Stock Exchange for the time period under consideration.

The interest expenses (x_1), Wages and Salaries (x_2), and Other operating expenses (x_3) formed the input variables whereas interest income (y_1) and other operating income (y_2) made up the output variables used by the study. Based on the data presented in Table 4.1, during the years 2010 to 2020, banks generated an average of GHS 332,788,360.00 in net interest income from their business operations. This figure was arrived at by subtracting the average interest expenses of GHS 92,233,720.00 from the

average interest income of GHS 425,022,080.00 for the period under consideration. The banks' total expenditures on wages and salaries came to an average of GHS 139,908,160.00, while their expenditures on other operating expenses was GHS 253,733,510.00. The money that was created on a yearly basis from the activities of running the business was GHS 425,022,080.00. The maximum amount that a bank may pay out in interest expenses was GHS 1,007,340,000.00, while the maximum amount that a bank could receive in interest income was GHS 2,452,447,500.00.

Similarly, Personnel salary by a bank reached a maximum of GHS 139,908,160.00, while operations expenses reached a maximum of GHS 2,452,447,500.00 and other operating expenses reached a maximum of GHS 1,264,155,000.00. The correlation between interest income and interest expenses was closed since their means, and standard deviations were similar. However, the standard deviation and the mean are separated for wages and salaries, other operating expenses, and income.

	Minimum	Maximum	Mean	SD
First Stage Variables				
Interest Expenses (GHS 000)	10,190.84	1,007,340.00	92,233.72	9,223.37
Wages And Sal. (GHS 000)	12,269.00	804,922.50	139,908.16	92,233.72
Operation Expense (GHS 000)	25,610.36	1,264,155.00	253,733.51	92,233.72
Interest Income (GHS 000)	44,186.00	2,906,122.50	425,022.08	92,233.72
Total Operating Income (GHS 000)	38,244.00	2,452,447.50	478,689.05	92,233.72
Second Stage Variable				
ΔMPI	-0.1067	0.51	0.201	0.175
BSIZE	5	16	11	2
BDIV	0	0.4132	0.3142	0.1123
EXEC	0	0.212	0.1211	0.9231

FSIZE	1,952,264.15	9,125,452,251.12	815,235,452.31	1.9455
FLEV	0.1102	0.7541	0.3314	0.8558
PCNIN	-0.109	0.802	0.5109	5.4117

Notes: Number of Observations equals 88

Source: Field Survey (2022)

During the course of the study, the average size of board members was nine, with the number ranging anywhere from five to sixteen (16). Additionally, an average of 31.42% of women serve on the board. There were some boards that did not have any representation of the female gender at all, while other boards had a maximum of 41.32% of the board members being female. With regard to the compensation of executives, only 12.11% of executives were given the option to purchase shares during the period under review. During the period in question, the leverage of the banking institutions ranged from a low of 11.02% to a high of 75.41%, with an average of 33.14%. The size of banks, as determined by their total assets, ranged anywhere from GH₵1,952,264.15 to GH₵9,125,452,251.12 throughout the research period, with an average of GH₵815,235,452.31. There is evidence that the sampled banks come in various sizes thanks to the extensive size range of the banks.

Validity Determination for the First-Stage Variables

The initial phase of this study involves a non-parametric test, which requires the isotonicity test to prove the model's validity. This property stipulates that an increase in inputs should match to an increase in outputs. It suggests that there should be a positive correlation between the input and output variables (Ray & Mukherjee, 2017; Adusei, 2016; Dorri & Rostamy-Malkhalifeh, 2017; Malekmohammadi & Alimohammadizadeh, 2014). Moreover, the magnitude of correlation coefficients is not necessarily a

concern, despite a low correlation value being acceptable (Dyson et al., 2001). The correlation coefficients between the input and output variables and the corresponding p-values under the null hypothesis of no connection are presented in the tables below. The analysis demonstrated a positive association between the variables for the entire length at a significance level of 1%. The correlation coefficients are displayed in Tables 3. It shows that the model's specification is suitable for the analysis.

Table 4: Correlation among the First-Stage Variables

	Interest Expenses	Wages &Salaries	Operation Expenses	Interest Income	Total Operating Income
Interest Expenses	1				
Wages And Salaries	0.771** 0.000	1			
Operation Expenses	0.762** 0.000	0.981** 0.000	1		
Interest Income	0.791** 0.000	0.907** 0.000	0.910** 0.000	1	
Total Operating Income	0.726** 0.000	0.918** 0.000	0.939** 0.000	0.940** 0.000	1

Notes: ** *correlation is significant at the 0.01 level (2-tailed)*

Source: Field Survey (2022)

Productivity Evaluation of Individual Banks

This section of the study looks at the efficiency of each of the eight (8) banks from 2010 to 2020. The technical efficiency and pure technical efficiency of each of the banks is decomposed into scale efficiency during the period under review. In accordance with the first objective of the study, which was to evaluate the efficiency and productivity of the listed banks from

2010 to 2020, the study used efficiency evaluation to accomplish the aim of the research because efficiency evaluation uses variables that determine the profit productivity of each bank. This is in line with the first objective of the study. The computation of efficiency was based on a geometric mean, which was similar to what was found in the literature (Kale et al., 2015; Muvingi & Hotera, 2015). In order to assess the effectiveness of the banks that were listed, the research utilized the DEA's method of calculating profit productivity. The radial model of DEA must deal with either a proportional decrease in inputs given outcomes or a proportional increase in outputs given inputs (Kaczorek, 2012; Ghobadi, 2019; Cooper et al., 2011).

CCR and BCC models were utilized as a consequence. Using both the CCR model's constant scale returns and the BCC model's variable scale returns, researchers were able to maximize both their technical efficiency and their overall research effectiveness. This enabled the researchers to determine each bank's scale efficiency. Table 4 illustrates the computation of production efficiencies of the listed banks using MAXDEA software. According to the CCR model, the cumulative average technical efficiency for the period was 75.56%, which was decomposed into pure technical efficiency of 82.91% and scale technical efficiency, which was 89.22%. These averages are based on the geometric mean of the eight (8) listed banks used for the study.

During the period under review (the year 2010 to 2020), Standard Charted Bank GH. Ltd recorded the highest production technical efficiency of 86.81%. in contrast, Agricultural Development Bank GH Ltd recorded the least production technical efficiency of 39.70%. From the analysis, seven (7) out of the eight (8) listed banks recorded their technical efficiency above

80%. Because the technical efficiency assesses the banks' capacity to generate the greatest amount of output from a predetermined set of inputs, it is one of the most important components used for determining the profit productivity of decision-making units. This will have an effect on the firm's overall operating costs, and as a result, it will have a direct impact on the company's position in the market. Thus, in expectation, of ADB Ghana Ltd. All the listed banks used in this study performance very well.

Similar to the technical efficiency, the level of the banks' pure technical efficiency can be determined by analyzing the extent to which it can reduce its inputs (in a predetermined percentage) while continuing to operate within the VRS frontier. The analysis indicated that all the banks achieved a moderate pure technical efficiency of more than 50%. The lowest being that of ADB Ghana Ltd with its pure technical efficiency of 53.58%. Likewise, scale efficiency is the relationship between the level of output and the average cost; as a result, it is directly related to the extent to which an organization's operations are carried out. The analysis revealed that ADB Ghana Ltd has the least scale efficiency of 70.30%. In contrast, the greatest scale efficiency of 95.18% during the period under review is attributable to Cal Bank Ghana Ltd.

Overall, the study revealed that the listed banks used for the study did not operate at the optimal efficiency level, as the average efficiency score for all the banks was 75.56%. This implies that banks suffered, on average, 24.44% technical inefficiency. To put it another way, the listed banks would have had more room to expand their output if they had functioned at the same level of efficiency as the most efficient bank in the sample. Also, the fact that

the score for pure technical efficiency went up over the period suggests that the banks' managerial efficiency got better over that period. The pure technical efficiency average of 82.91% indicates that each and every one of the listed banks suffered a pure technical inefficiency of 17.09% during the period. The study, therefore, discovered that none of the banks achieved 100% efficiency even though more recorded a more significant figure in terms of their efficiencies. Table 4 illustrates the efficiencies scores of the banks.

Table 5: Technical Efficiency Score, Pure Technical Efficiency Score, and Scale Efficiency Score

	Technical Efficiency Score	Pure Technical Efficiency Score	Scale Efficiency Score	Ranking
Access Bank	0.8401	0.9077	0.9236	4th
ADB Bank GH Ltd	0.397	0.5358	0.703	8th
Cal Bank GH Ltd	0.8532	0.8952	0.9518	1st
Ecobank GH Ltd	0.8659	0.9199	0.9408	2nd
GCB Bank PLC	0.8467	0.925	0.9123	5th
Republic Bank GH Ltd	0.7375	0.8235	0.907	6th
Standard Charted Bank PLC	0.8681	0.925	0.94	3rd
SG-SSB GH Ltd	0.6363	0.7009	0.8587	7th
	Mean	Minimum	Maximum	
Technical Efficiency Score (CRS)	0.7556	0.8291	0.8922	
Pure Technical Efficiency Score	0.397	0.5358	0.703	
Scale Efficiency Score	0.8681	0.925	0.9518	

Source: Field Survey (2022)

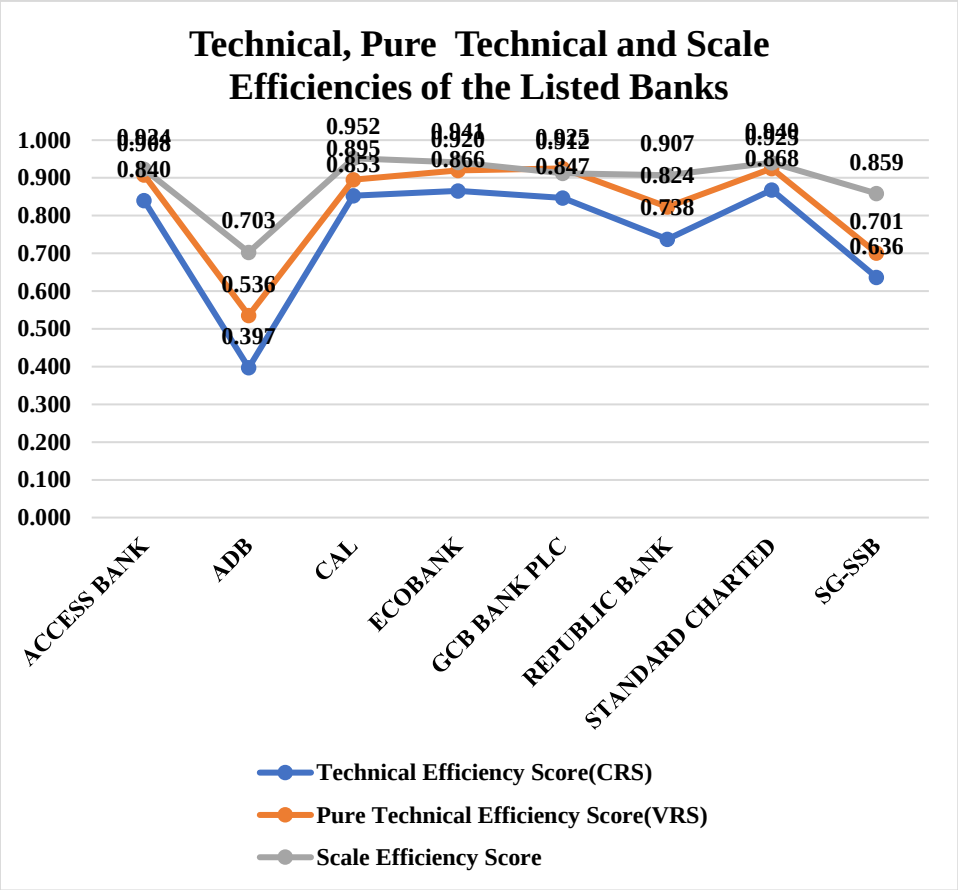

Figure 1: Technical, Pure Technical and Scale Efficiencies of the Listed Banks

Source: Field Survey (2022)

Productivity change of the listed banks using malmquist productivity index

Using statistical information gathered on the listed banks, the study used Malmquist Productivity Index to compute the productivity changes throughout the study. The Malmquist Productivity Index compares the relative performance of two time periods and two economies and quantifies productivity from one period to the next. This performance measurement method was utilized to compare bank efficiency from one period to the next (that is 2010 to 2020). Adjacent Malmquist Productivity Index by Fare et al.

(1994) is the DEA-based Malmquist Productivity Index employed by this study. This method was chosen over others since it is widely employed in academic studies and is simple to implement. Using the three inputs and the two outputs to calculate efficiency scores, the MPI calculates the total change in productivity across all banks.

This research is ideal for the MPI's capacity to handle multiple inputs and outputs with minimal preconceptions and without input and output price data. The MPI throughout the era is the geometric means of productivity during the eleven (11) years periods. The overall productivity change of each bank was split into efficiency change, also referred as the catch-up impact, and technology change, commonly known as the border shift effect (Fare et al., 1992; 1994). The catch-up effect measures the degree to which a bank's efficiency improves or drops and is connected to the bank itself (i.e., how it is catching up with the best-performing bank) (i.e., how it is catching up with the best-performing bank). Technical progress, new ideas, the rules of the game, and the marketplace all play a role. In comparison, the frontier shift establishes the efficient change of frontiers and is tied to technological advancement or regression that affects all banks in the industry (Bogetoft, 2013). An index of one (1) indicates no change in productivity. In contrast, an index greater than one (1) implies an increase in productivity over the period under review and an index less than one (1) indicates productivity decline.

The analyzed data indicated that ADB Ghana Ltd, Republic Bank Ghana Ltd and SG-SSB Ghana Ltd recorded a decline in productivity. At the same time, the remaining five banks saw their production increase. These are

Access Bank Ghana PLC, Cal Bank Ghana PLC, Ecobank Ghana Ltd, GCB Bank Ghana PLC and Standard Chartered Bank PLC. They have their Malmquist Productivity Index (MPI) of more than one (1). Table 5 shows the geometric Malmquist Productivity Index (MPI) for the eight (8) listed banks over the period under review, while the accompanying Figure 2 illustrates the productivity of the banks

Table 6: Total Productivity of the Listed Banks Using Malmquist Productivity Index

DECISCION-MAKING UNITS	MPI(k)	EC(k)	TC(k)
ACCESS BANK	1.0922	1.0068	1.0996
ADB BANK GH LTD	0.5161	0.7662	0.3954
CAL BANK GH LTD	1.1092	1.0375	1.1508
ECOBANK GH LTD	1.1257	1.0255	1.1544
GCB BANK PLC	1.1007	0.9944	1.0946
REPUBLIC BANK GH LTD	0.9588	0.9886	0.9479
STANDARD CHARTED PLC	1.1286	1.0246	1.1564
SG-SSB GH LTD	0.8272	0.9359	0.7742
GEOMEAN	0.9823	0.9724	0.9717

Source: Field Survey (2022)

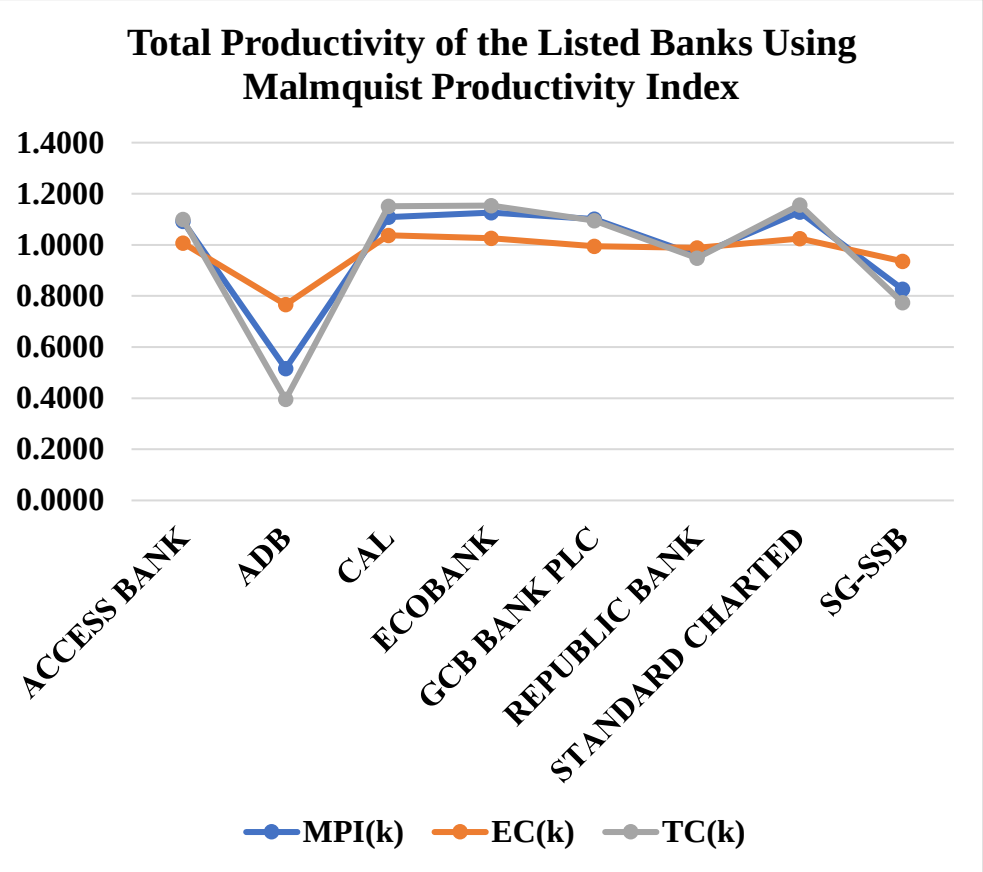

Figure 2: Total Productivity of the Listed Banks Using Malmquist Productivity Index

Source: Field Survey (2022)

Panel data modelling

The study analyzed the data for the second stage by employing multi-level regression using random and fixed effects models. The very low p-value *(p = 0.0000)* at a 1% significance level shows that the null hypothesis should be rejected. The researcher next applied the Hausman Test to evaluate the random and fixed effects models to identify which model was most suitable for the investigation. The null hypothesis of random-effects modeling's suitability is compared to the alternative hypothesis of fixed-effects modeling's suitability. This is performed in order to assess which model may be appropriate for the inquiry.

Ho: Random-effects model is appropriate.

H_A: Fixed-effects model is appropriate.

The p-value of the Hausman test for the periods under reviewed (the year 2010 to 2020) is statistically significant: (p-value = 0.350). Thus, no evidence exists against rejecting the null hypothesis. The study consequently utilized the random-effects model to analyze the collected data. Breusch and Pagan's Lagrangian multiplier test for random effects was utilized to cross-validate the selection of the random-effects model in order to determine if it was appropriate. The null hypothesis that there is no variance across entities was compared to the alternative hypothesis that there is a large variance between entities (there is a panel effect). These hypotheses are stated below:

Ho: There is no variation between the entities. (No panel effect).

H_A: There is a substantial disparity in variance between the entities. (The panel effect exists.).

Table 7: Panel Modeling Tests

Types of Test	Test Value	Test statistic	p-value
Normality	Shapiro-Wilk	z-Stat	
	0.9204	**5.134**	**0.2139**
Presence of Panel Effect			
		Chi(1)	
		37.77	0.0000
First-order Autocorrelation			
	Wooldridge test		
	0.3117		0.4150
Cross-sectional independence			

	Pesaran's CD Test	Average Value	
	-2.72	0.347	1.2854
Test for Stationarity of Panel Data			
Levin-Lin-Chu			
		-3.895	0.0000
Notes: Number of Observations equals 88			

Source: Field Survey (2022)

The findings indicate that the null hypothesis should be rejected; nevertheless, the p-values are not significant enough to imply that the null hypothesis should be rejected. This indicates that the random-effects model is suitable for the data that was utilized in this investigation.

Diagnostic test for the regression model

This section analyzes how well the data fits the Regression model's assumptions and gives a better fit for the model employed for the study or research objectives. Thus, the study used the Shapiro-Wilk W test for Normal Data to test the normality of the panel data, the Wooldridge test for autocorrelation in panel data, Pesaran's (2004) CD Test for the cross-section independence in the panel data and the Unit roots test for the test of Stationarity of the panel data.

Test of normality (Shapiro-Wilk W test for normal data).

The Shapiro-Wilk W test was employed to examine the normality of the data set. The study compared, at a significance level of 0.05, the null hypothesis that the population is normally distributed to the alternative hypothesis that the population is not normally distributed, as stated below:

H_O: The population follows a normal distribution.

H_A: The population does not follow a normal distribution.

The p-value of *(p-value = 0.2139)* is much greater than the alpha value at 5% *(p-value = 0.05)*, as seen in the table below. As a result, the study cannot reject the null hypothesis and came to the conclusion that the evaluated data did not exhibit non-normal distribution properties.

Wooldridge Test for Determination of Autocorrelation

When comparing the null hypothesis of no serial autocorrelation to the alternative hypothesis of serial autocorrelation is present in the panel data, the Wooldridge test of autocorrelation was utilized to evaluate the existence or absence of serial correlation in the panel data. The tested hypotheses are:

H_O: No significant first-order autocorrelation in the panel data.

H_A: There is the autocorrelation of the first order in the panel data.

Based on the statistics of the Wooldridge test and its much higher p-values *(p = 0.4150)*, at a 5% significance level, there is no justification against the null hypothesis. Therefore, it may be argued that there is no serial autocorrelation in the used data set.

Test of Cross-Section Independence (Pesaran's (2004) CD Test)

The purpose of carrying out this test is to establish whether or not the residuals can be connected between the different entities. The findings of a test could be biased if it has a cross-sectional reliance. The term for this kind of connection is the contemporaneous correlation. In this experiment, we compare the null hypothesis, which states that there is no correlation between

the residuals, to the alternative hypothesis, which states that there is a correlation between the residuals.

H_O: Residues have no correlation.

H_A: Residues are not linked, hence there is cross-sectional dependency.

According to the findings of Pesaran's (2004) CD test, the p-value is statistically significant, suggesting that there is no evidence to reject the null hypothesis. Under Random Effects modeling, the study revealed that there is cross-sectional independence among the entities as shown in Table 6. Otherwise, there is no correlation between residuals.

Unit Root Test for Stationarity of Panel Data

The study examined if a panel data set is stationary. This is done to detect any potential unit roots in the data used to analyze the productivity of the listed banks on the All Shares Index of the Ghanaian banking sector. The null hypothesis that the panel data sets contain unit root is compared to the alternative hypothesis that the panel data sets are stationary. The tested hypotheses are as follows, and the test results as conducted using the Levin-Lin-Chu Test is as follows:

Ho: Panels include unit roots.

H_A: Certain panels are immobile.

From Table 6, the test statistics are extremely high, and the p-values are considerably low. This indicates that the null hypothesis that the panels contain unit roots is rejected.

Multicollinearity of indicators

The Variance Inflation Factor (VIF) is frequently used to quantify the level of multicollinearity of the *ith* predictor variables in a regression model with the other predictor variables. According to the rule of thumb for determining multicollinearity for variables using the VIF, values less than 10 indicate that multicollinearity does not exist (O'brien, 2007). It can be shown in Table 7 that the VIF is less than 10 for all of the independent variables. The values for the VIF indicate that the variables used as the independent and control variables are not collinear.

Table 8: Variance Inflation Factor of Independent Variables

Variable	Tolerance	VIF
BSIZE	0.994	1.006
BDIV	0.975	1.025
EXEC	0.266	3.756
FSIZE	0.985	1.015
FLEV	0.212	4.716
PCNIN	0.505	1.98

Source: Field Survey (2022)

The Pearson's correlation coefficient is used to determine the level of association between the dependent variable (change in Malmquist Productivity Index) and the independent variables (board size, board member diversity, executive share compensation) and the control variables (financial leverage, firm size and growth in banking operations). All the independent and control variables are statistically significant, with the dependent variable at the conventional 1%, 5% and 10% significance levels. None of the

coefficients of the variables is greater than 0.80, indicating the absence of multicollinearity among the variables.

The analysis using the Pearson correlation coefficients indicated that board size and board diversity positively correlate with banks' total productivity as measured by the change in Malmquist Productivity Index (MPI). Similarly, bank size and growth in banking operations positively correlate with the change in banks' total productivity as measured by Malmquist Productivity Index. This implies that an improvement in board size, board diversity, bank size and growth in banking operations are expected to improve the banks' total productivity significantly.

However, executive compensation and financial leverage are negatively associated with banks' total productivity as measured by the Malmquist Productivity Index (MPI) change. This indicates that an increase in executive compensation and financial leverage of the banks is expected to decrease the banks' total productivity as measured by the change in Malmquist Productivity Index (MPI). Table 8 illustrates the above information.

Table 9: Pearson's Correlation Coefficients of the Variables

	ΔMPI	BSIZE	BDIV	EXEC	FSIZE	FLEV	PCNIN
ΔMPI	1						
BSIZE	0.325** (0.000)	1					
BDIV	0.286** (0.000)	0.015 (0.854)	1				

EXEC	-0.030*** (0.014)	0.027 (0.737)	-0.068* (0.098)	1		
FSIZE	0.033* (0.097)	-0.022* (0.081)	0.036 0.656	-0.081 0.316	1	
FLEV	-0.068* (0.099)	-0.052 (0.020)	0.020 0.801	-0.762** (0.000)	0.012 0.804	1
PCNIN	0.241*** (0.002)	0.065 0.419	-0.059 0.466	0.010 0.808	0.070 0.383	-0.458** (0.000)

Source: Field Survey (2022)

The regression output for the study is shown in Table 9 below. The table shows the independent variables and their responding test statistics values. These statistics ate the regression coefficients, the standard error of the coefficients, the z-statistics and the significance values. The z-statistic measures the predictability of the independent variables. Thus, an independent variable's ability to predict its dependent variable is tested using this method. It determines how far the coefficient deviates from zero in terms of standard deviation. Any z-statistic more than +1.1.645 but less than –1.645 is allowed. From the analyzed data, only the z-statistics of executive compensation (EXEC) and financial leverage (FLEV) fall within the impermissible region. This implies that the remaining variables are good predictors of bank profit productivity of the listed banks.

Also, the Wald Test/ LR Chi (11) of 30.380 is significantly large, resulting in the model's very low significant value (p-value = 0.000). This

indicates that the model is a good predictor of the banks' profit productivity of the listed banks. Similarly, the coefficient of determination of the regression model as measured by the R-squared is 0.524. This result means that about 52.4% of the banks' total productivity variability, as measured with the change in the Malmquist Productivity Index (Δ***MPI),*** is being explained by the board size, board diversity, executive compensation, bank size financial leverage and growth in banking operations.

The study's first hypothesis tested the effects of board size on the profit productivity of Ghana Stock Exchange-listed banks. The coefficient of board size is 0.001 according to the Random-Effects Generalized Least Squares Regression analysis. The positive coefficients indicate a positive relationship between board size and profit productivity of Ghana Stock Exchange-listed banks and are statistically significant at the 1% level. Therefore, the study refutes the null hypothesis that board size does not affect the profit productivity of banks listed on the Ghana Stock Exchange. The coefficient of 0.001 for board size indicates that, when all other independent variables are held constant, a 100% increase in the number of board members is expected to increase the profit productivity of banks listed on the Ghana Stock Exchange by 0.1%.

The second hypothesis of the study sought to test the effects of board diversity on the profit productivity of listed banks on the Ghana Stock Exchange. From the regression analysis using the Random-Effects Generalized Least Squares Regression, the coefficient of board size is 0.015. The positive coefficient implies a positive relationship between board diversity and profit productivity of listed banks on the Ghana Stock Exchange

and is statistically significant at a 1% significance level. The study, therefore, rejects the null hypothesis that board diversity does not influence the profit productivity of listed banks on the Ghana Stock Exchange in any way. The coefficient of 0.015 for board diversity implies that when all other independent variables were held constant, a 100% enhancement in board diversity is expected to increase the profit productivity of listed banks on the Ghana Stock Exchange by 1.5%.

The fifth hypothesis of the study examined the impact of firm size on the profit productivity of Ghana Stock Exchange-listed banks. Based on the Random-Effects Generalized Least Squares Regression analysis, the coefficient of firm size is 0.006. The positive coefficient indicates a positive relationship between firm size and profit productivity of Ghana Stock Exchange-listed banks and is statistically significant at the 10% level. Therefore, the study refutes the null hypothesis that firm size does not affect the profit productivity of banks listed on the Ghana Stock Exchange. The coefficient of 0.006 for firm size indicates that a 100 percent improvement in the firm size (natural log of total assets) is expected to increase the profit productivity of listed banks on the Ghana Stock Exchange by 0.06 percent when all other independent variables are held constant.

The sixth hypothesis of the study sought to test the effects of the growth in banking operations on the profit productivity of listed banks on the Ghana Stock Exchange. From the regression analysis using the Random-Effects Generalized Least Squares Regression, the coefficient of growth in banking operations is 0.119. The positive coefficient implies a positive relationship between growth in banking operations and profit productivity of

listed banks on the Ghana Stock Exchange and is statistically significant at a 10% significance level. The study, therefore, rejects the null hypothesis that growth in banking operations does not influence the profit productivity of listed banks on the Ghana Stock Exchange in any way. The coefficient of 0.119 for growth in banking operations implies that when all other independent variables were to be held constant, a 10% growth in banking operations is expected to increase the profit productivity of listed banks on the Ghana Stock Exchange by 1.12%.

The third hypothesis of the study sought to test the effects of executive compensation on the profit productivity of listed banks on the Ghana Stock Exchange. From the regression analysis using the Random-Effects Generalized Least Squares Regression, the coefficient of executive compensation is 0.007 but statistically insignificant. The study, therefore, fails to reject the null hypothesis that executive compensation does not influence the profit productivity of listed banks on the Ghana Stock Exchange in any way. Similarly, the fifth hypothesis of the study sought to test the effects of financial leverage on the profit productivity of listed banks on the Ghana Stock Exchange. From the regression analysis using the Random-Effects Generalized Least Squares Regression, the coefficient of financial leverage is 0.002 but statistically insignificant. The study, therefore, fails to reject the null hypothesis that financial leverage does not influence the profit productivity of listed banks on the Ghana Stock Exchange in any way.

Table 10: Random-Effects Generalized Least Squares Regression

Variables	Coefficients	Standard Error	z-Stat	Sig-Value
BSIZE	0.001***	0.356	0.000	
BDIV	0.015***	0.006	2.6	0.009
EXEC	0.007	0.006	1.17	0.243
FSIZE	0.006	0.003	1.87	0.061
FLEV	0.002	0.002	1.18	0.240
PCNIN	0.119***	0.040	2.97	0.003
Constant	0.480***	0.094	5.09	0.000
Other tests				
Wald tests	30.38			
Hausman Test	0.35			
P-value	0.000			
R-squared	0.524			
Adj. R-sqd	0.489			
Notes: Number of Observations is 88				

Source: Field Survey (2022)

Discussion of Results

This study aimed at determining the profit productivity of the banks listed on the Ghana Stock Exchange between 2010 and 2020. This led the study to gain insight into the listed banks' total productivity, technological, and efficiency changes using the CCR and BCC models of the non-parametric Data Envelopments Analysis (DEA). Overall, the analysis found that none of the listed banks operated at the ideal efficiency level, as the average efficiency score for all the banks was 75.56%. This indicates that banks had an average of 24.44% technical inefficiency. If the listed banks had performed at the same level of efficiency as the most efficient bank in the sample, they would have had greater space to increase their production.

In addition, the fact that the score for pure technical efficiency increased over time shows that banks' management efficiency improved with time. The average pure technical efficiency of 82.91% implies that each listed bank experienced a 17.09% pure technical inefficiency over time. Therefore, the study found that none of the banks attained 100% efficiency, even though a more significant number of listed banks reported a higher efficiency rate.

Further, the analysis of the total productivity change of the banks indicated that five out of the eight banks have their productivity progressed over the period. The study analyzed each bank's overall productivity change, divided into efficiency change and technical change. The catch-up impact assesses a bank's improved or declining efficiency and is bank-specific. These factors include technology, innovation, regulation, and competition. Frontier shift establishes efficient frontier changes and is connected to technical improvement or regression affecting all banks in the business. The study found that ADB Ghana Ltd, Republic Bank Ghana Ltd, and SG-SSB Ghana Ltd had productivity declines. In contrast, Standard Chartered Bank PLC, Access Bank Ghana PLC, Cal Bank Ghana PLC, Ecobank Ghana Ltd, and GCB Bank Ghana PLC have their productivity increased. These findings confirmed earlier studies by Mohammed and Gani (2012), Gogovie (2019), Agbemakor (2019), Adegbaju and Olokoyo (2008).

The study's second objective examined the association between the corporate governance variables and profit productivity of the listed banks between 2010 and 2020 as measured by the change in the Malmquist Productivity Index. The study used Pearson's correlation coefficient to evaluate the variables' relationship. The study established that board size and

board member diversity are positively associated with banks' profit productivity as measured by the change in Malmquist Productivity Index. This implies that board size and diversity improvement are expected to significantly improve the banks' profit productivity. However, executive compensation is negatively associated with banks' profit productivity as measured by the change in Malmquist Productivity Index but is statistically significant at a 1% significance level. This indicates that an increase in executive compensation is expected to decrease the banks' profit productivity as measured by the change in Malmquist Productivity Index (MPI).

The third objective examined the impacts of the variables on the profit productivity of the listed banks between 2010 and 2020. The study used the random-effects generalized least squares regression based on the Hausman test conducted and other diagnostic tests for panel data modelling. The board size coefficient of 0.001 indicates a positive association between board size and profit productivity of GSE-listed banks. All other variables kept equal, a 100% increase in board members is predicted to boost Ghana Stock Exchange banks' profit productivity by 0.1%. Board size coefficient is 0.015. At a 1% significance level, the positive coefficient indicates a positive association between board diversity and profit productivity of Ghana Stock Exchange-listed banks. A 100% increase in board diversity is predicted to raise the profit productivity of listed banks on the Ghana Stock Exchange by 1.5%. Firm size's influence on profit productivity is 0.006. This reveals a favourable association between business size and profit productivity of Ghana Stock Exchange-listed banks.

The coefficient of 0.006 for firm size suggests that a 100% improvement in company size (natural log of total assets) will raise the profit productivity of listed banks on the Ghana Stock Exchange by 0.06%. The impacts of banking operations growth on listed banks' profit productivity have a positive coefficient of 0.119, suggesting a favourable association at a 10% significance level. The coefficient of 0.119 for growth in banking operations means that a 10% expansion in banking operations is predicted to boost the profit productivity of listed banks on the Ghana Stock Exchange by 1.12%. The coefficient of executive compensation is 0.007 but is statistically insignificant. Similarly, the coefficient of financial leverage is 0.002 but statistically insignificant. Therefore, these two variables do not influence the profit productivity of listed banks on the Ghana Stock Exchange in any way.

Prior studies have established a strong correlation between the size of a board's executive committee and banks' technical and bank profit productivity (Srivastav & Hagendorff, 2015; Gupta, 2021; Liu et al., 2016; Tanna et al., 2011). It also supports the idea of resource dependence (which indicates how a bigger board size enables a firm to obtain the requisite resources for efficient operations). It has been suggested in the past that larger boards, i.e., those with more than six members, are less successful because of the potential for conflict among directors and the potential for power disparities in the boardroom to cause a decline in performance (Owen & Temesvary, 2019; Okoyeuzu et al., 2021; Okoyeuzu et al., 2021; Nguyen et al., 2015; Owen, 2016).

According to random effect regression models, gender diversity on publicly traded-bank board's considerably increases profit productivity. This

follows both the resource dependency theory and the agency theory. When compared to the first, the latter states that a more diverse board ensures that no one person can exert control over the firm's decision-making process. This is because a more diversified board connects their organizations to the environment and creates strategic input for improving performance (Okoyeuzu et al., 2021). Based on the results of this study, earlier research has shown that banks with a more gender-diverse board perform better financially and on the stock market (Owen & Temesvary, 2019; Okoyeuzu et al., 2021; Okoyeuzu et al., 2021; Nguyen et al., 2015; Owen, 2016). Gender diversity on the board was demonstrated to have no meaningful impact on the performance of banks in Gulf Cooperation Council (GCC) nations (Al-Musalli & Ismail; 2012).

The effect of director share-based pay has a negligible negative influence on the profit productivity of publicly traded banks. This contradicted the claims of the agency hypothesis. Because managers are risk-averse, the theory of agency suggests that equity-settled bonuses have incentives to make more value-maximizing company decisions because of the link between their income and firm performance (Liu et al., 2016; Asyari & Maritsa, 2020; Rasoava, 2019). However, Bebchuk (2009) revealed a considerable negative impact of stock pay on company value or sales growth in earlier studies.

CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATION

Introduction

This section presents a summary of the results, conclusion, and recommendations for future research about the impact of corporate governance on the profit productivity of the listed banks in the Ghanaian banking industry. The summary describes the core facts and focus of the research findings. In conclusion, the inferences drawn from the research's empirical evidence are listed. The study also provided recommendations based on the research's findings. These proposals apply to academic study, policy regulation, managerial industry practice, and banking sector clients.

Summary of the Study

This study examined the corporate governance variables on the profit productivity from 2010 to 2020 of banks listed on the Ghana Stock Exchange using CCR and BCC models of non-parametric Data Envelopment Analysis. The approach enabled the study to gain insight into the listed banks' total productivity, technical, and efficiency changes (DEA). The study established that none of the listed banks had optimal operation efficiency since the average score was 75.56%, implying that banks had 24.4% technological inefficiency. It was also discovered that pure technological efficiency grew as the average pure technical efficiency for the period was 82.91%. Thus, the fact that banks' managerial efficiency improved over time.

The banks' total productivity change analysis showed that five out of eight banks improved. The study assessed each bank's overall productivity change by efficiency and technology. The bank-specific catch-up impact

measures enhanced or decreased efficiency. It was discovered that technology, innovation, legislation, and competition are essential. ADB Ghana Ltd, Republic Bank Ghana Ltd, and SG-SSB Ghana Ltd experienced decreased productivity. Standard Chartered Bank PLC, Access Bank Ghana PLC, Cal Bank Ghana PLC, Ecobank Ghana Ltd, and GCB Bank Ghana PLC boost productivity. Mohammed and Gani (2012), Gogovie (2019), Agbemakor (2019), Adegbaju and Olokoyo (2008) confirmed this finding. The study further examined the relationship between corporate governance variables and profit productivity of listed banks between 2010 and 2020. The study found that board size and diversity favorably affect banks' profit productivity. Thus, increasing board size and diversity have boosted banks' profit productivity. However, executive compensation is inversely associated with banks' profit productivity but is significant at a 1% level.

Key Findings

A rise in executive pay is projected to reduce banks' profit productivity, as measured by the Malmquist Productivity Index (MPI). The effects of corporate governance variables on listed banks' profit productivity from 2010 to 2020 were also examined. The study used random-effects generalized least squares regression and other panel data diagnostic tests. It was discovered that board size and diversity positively affect GSE-listed bank profit productivity. The study also found that bank size and growth in banking sector activities positively impact banks' profit productivity during the period under review. The study, however, disclosed that executive compensation and financial leverage have a positive coefficient but are statistically negligible. Hence, these two variables do not affect the profit productivity of Ghana Stock Exchange-listed banks.

Conclusions

The study examined the impacts of corporate governance on the profit productivity of the listed banks on the Ghana Stock Exchange between 2010 and 2020. The study used eight (8) banks listed on the Ghana Stock Exchange between 2010 and 2020, namely Access Bank, ADB Bank Ghana Ltd, Cal Bank Gh Ltd, Ecobank Ghana Ltd, GCB Bank PLC, Republic Bank Gh Ltd, Standard Charted PLC, and SG-SSB Ghana Ltd. The study employed a non-parametric method of Data Envelopment Analysis at its first stage that determined the efficiencies of the banks. In addition, the Malmquist Productivity Index (MPI) is used to evaluate the banks' total productivity change. The first stage results indicated that none of the listed banks achieved optimal operational efficiency, as the average technical efficiency score was 75.56%, indicating technical inefficiency of 24.4%.

In addition, it was revealed that pure technical efficiency increased, as the period's average pure technical efficiency was 82.91%. The total productivity change analysis of the banks revealed that five of the eight (8) have their total factor productivity increased over time. The productivity of ADB Ghana Ltd, Republic Bank Ghana Ltd, and SG-SSB Ghana Ltd dropped. Standard Chartered Bank PLC, Access Bank Ghana PLC, Cal Bank Ghana PLC, Ecobank Ghana Ltd, and GCB Bank Ghana PLC all increased. This finding agreed with precious studies such as Ibrahim et al. (2019), Gogovie (2019), Agbemakor (2019), Adegbaju and Olokoyo (2008), Mohammed and Gani (2012), and Sani and Alani (2013).

The study used Random-Effects Generalized Least Squares Regression analysis at the second stage that examined the impacts of corporate governance variables on the profit productivity of the listed banks.

The study found board size and diversity boost the profit productivity of the listed banks. It further establishes that the firm's size and growth in the operational activities of the listed banks have significantly improved the profit productivity. The study concludes that increasing board size and diversity have increased bank profitability as board size and diversity boost GSE-listed bank profit productivity.

Similarly, bank size and expansion in banking sector activities positively affect banks' profit productivity. On the contrary, executive share compensation and financial leverage do not influence the profit productivity of the banks in any way.

Recommendation

Study findings and conclusions are significant in policy, practice, and research implications. The report makes the following suggestions. The study revealed that some banks did not achieve their total technical efficiency during the period. At the same time, the total productivity of the three banks also declined during the period under review. The executive share compensation was also inadequate to boost the listed banks' profit productivity. Therefore, the study recommended that bank managers improve their managerial abilities to complement technical advances in the banking industry. Large banks should downsize and diversify their boards to boost productivity. Board directions should improve the executive share compensation of the directors and executive members of the banks that could tie the performance through executive share compensation to motivate them to do more. Also, equity paid payment as part of directors' remuneration limits conflict of interest, making them behave more in the interest of

shareholders by adopting value-maximizing decisions, which improves productivity.

Non-performing loans (NPLs) were not considered while evaluating bank productivity in this study. Therefore, the study recommended that future research for bank productivity evaluation should consider unwanted output, such as non-performing loans (NPLs). This study offered a breakdown of profit productivity into profit technology change and profit efficiency change. To understand where productivity comes from, future research should look at how profit efficiency changes are decomposed into technical and technological changes to obtain changes in technical efficiency and changes in allocative efficiency in banks.

For the sake of gender equality on bank boards, the Bank of Ghana should establish minimum female board membership requirements. In addition to ensuring gender parity, such a program has the potential to boost bank productivity in Ghana.

Suggestions for Further Studies

This study was based on quantitative analysis, as a result, the employees were not able to describe the situation and explain in detail the reasons behind the answers that were given. In view of this soon, the mixed method (that is, both qualitative and quantitative) methods should be used. This will help the study results to reach a definite conclusion as both methods will complement each other's weaknesses. This study was carried out in only on the listed banks in Ghana Stock Exchange. Further studies can also engage in a comparative study across other banking institutions in Ghana.

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