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Bidirectional Optimality Theory: Unveiling the Relationship between Corporate Governance Compliance and Financial Performance in Emerging Economies

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Abstract
This study examines the dynamic and simultaneous interaction between corporate governance and financial performance nexus using secondary data from 29 firms listed on the Ghana Stock Exchange (GSE) from 2010 to 2021. A corporate governance index (CGI) was calculated using an unweighted dichotomous response technique based on 144 self-administered survey questions guided mainly by the Securities and Exchange Commission (SEC) code(s) of governance, while Return on Asset (a proxy for FP) was calculated by dividing Profit After Tax (PAT) by the total assets of the sampled firms over time. The Panel VAR estimation technique recommended by Abrigo and Love (2016) was used to empirically study the causality and simultaneous interaction between these two variables within the framework of bidirectional optimality theory. The findings provide a new evidence by demonstrating a positive and significant bidirectional nexus between CG and FP, confirming the bidirectional theory on the basis of lag one structure of the PVAR model. Thus, shareholders and other stakeholders seeking a better return on their investments would equally expect a competent and effective corporate governance system to protect their investment and interests in Ghana. The results of the forecast error variance decomposition analysis support the selection of corporate governance as the most endogenous variable. This study however, remains limited to Ghana and may not apply to other contexts.
Key Words: Corporate governance, Firm performance, PVAR model, Bidirectional Optimality theory.

1.Introduction

It is widely acknowledged that corporate governance (CG) and financial performance (FP) are two critical elements that influence the growth and long-term development of modern organizations. The relationship between these two constructs has unquestionably received significant scholarly attention through the lens of agency theory, stakeholder theory, resource dependence theory, and others, emphasizing their critical roles in shaping firm behavior, stakeholder relationships, and firm sustainable growth (Atugeba & Acquah-Sam,2024; Boateng et al.,2022; Ronoowah & Seetanah, 2022; Adjei-Mensah, 2019). The aforementioned theories incorporate concepts from other disciplines, such as economics and management studies, which has allowed recent scholars (Suwaiden et al. (2021; Coleman & Wu, 2020; Kodua, 2020; Puni & Anlesinya, 2020, Owusu & Wier, 2018) to offer diverse perspectives on the dynamic nature of CG

and FP relationship.

However, Ronoowah & Seetanah (2022) and Love (2011) observed in both developed and emerging economies that, while many prior studies have concluded on unidirectional nexus (that causality runs from CG to FP), others settled on reverse causality with the argument that the latter (FP) influences the former (CG). These diverse findings piqued the researchers' curiosity to question whether a possible bidirectional nexus exists between CG and FP in emerging markets such as Ghana through the lens of Bidirectional Optimality Theory (BiOT), which is an extension of Optimality theory (OT) developed originally by Alan Prince and Paul Smolensky in 1993 to elucidate how linguistic patterns are derived from interactions among constraints that prioritize different linguistic outcomes. Although BiOT is based on linguistic theory, its principles can be used metaphorically to explain the dynamic interplay between corporate governance quality and financial performance (FP) in corporate settings. In the context of CG, effective governance practices act as constraints aimed at optimizing transparency, fairness and accountability towards stakeholders in contemporary organizations (Coleman and Wu, 2020; OECD,2004; Freeman, 1984). Seemingly, these practices are crucial as it favorably drives firm profitability (Puni & Anlesinya, 2020). Conversely, a company's FP serves as an output that can influence its governance practices or quality. That is, higher profitability can provide resources to strengthen governance structures, while financial challenges may necessitate governance reforms to restore profitability and stakeholder confidence (SEC,2020). This understanding thereof, provides a presumption that bidirectional causality exists between CG and FP necessitating a comprehensive investigation into the nuanced dynamics at play. The essence is to add to the limited knowledge about bidirectional nexus in CG-FP debate in emerging economies such as Ghana. This is because, where this knowledge gap goes unaddressed, it remains convoluted as to how simultaneous interaction between these two variables of interest should influence policy and managerial decisions endogenously.

In Ghana, like many emerging economies, CG practices have undergone significant evolution in response to both domestic regulatory frameworks and international standards (Atugeba & Acquah-Sam,2024). The nation has been proactive in adopting the International Financial Reporting Standards (IFRS) in 2008 as well as other regulatory and governance reforms (Companies Code,2019(Act, 992); SEC, 2020) to improve corporate governance disclosures (Boateng et al.,2022), with the aim of promoting stakeholder accountability, equity, and responsibility of top management (Adjei-Mensah, 2019). However, the Ghanaian system is noted for not adhering to institutional frameworks, coupled with a weak and opaque legal system, breeding corruptible practices in its business environment (Kodua, 2020). The manifestation thereof was when UT Bank and Capital Bank were absorbed by GCB Bank (2016), and five indigenous banks end-up being consolidated to form Consolidated Bank of Ghana (2018), resulting in job losses and investors withdrawing their resources (Atugeba & Acquah-Sam,2024). What is more? The Ghanaian government spent a significant amount of ghs25 billion (BOG, 2023) to restore the stability and sustainability of corporate business in Ghana (Sarpong-Danquah et al., 2022). In all of these, accusing fingers have been pointed at low awareness of the SEC governance code (World Bank 2020), which has been identified as an effective mechanism to restore public trust (Coleman & Wu, 2020). If these calamities continue as usual, it has the tendency of decreasing Ghana's GDP, which is primarily dependent on the well-being of the private sector as it is in both developed and emerging economies. Specifically, there is a need for empirical research that examines how attributes enshrined in Ghanaian SEC governance code of best practices impact on FP, and vice versa over time, considering the unique institutional and market characteristics of Ghanaian business landscape (Asiedu et al., 2019). The choice to utilize the SEC

code of best practices to international standards was made with the goal of determining true reflections of Ghanaian governance quality, considering socio-cultural and legal distinctions (Adegbite et al., 2012).

As a result, the objective of this study is twofold: The first is to create an overall corporate governance index (CGI) among Ghanaian listed firms to inform investor opinion, and second is to determine whether there is a bidirectional causation between CGI and FP in Ghana.

The motivation of this study therefore, is to address the aforementioned knowledge, practice and theoretical gaps and contribute to the existing literature by looking into the bidirectional relationship between CG quality and FP among Ghanaian listed companies through the lens of bidirectional optimality theory, using Panel Vector autoregressive (PVAR) model recommended by Abrigo and Love (2016). To the best of the researchers' knowledge, this study demonstrates for the first time how to methodologically apply the PVAR model in understanding the dynamic interplay between CG and FP in Ghana. Besides, this study responds to the urgent call by Ronoowah & Seetanaa (2022) for an investigation into the simultaneous interaction between CG and FP in not only developed nations, but emerging economies as well. The outcome of this study seeks to uncover the mechanisms through which governance quality influences financial outcomes and vice versa, offering insights that are both theoretically robust and practically relevant for policymakers, corporate leaders, academicians and investors in Ghana's evolving business landscape. The rest of the paper is organized as follows. Section 2 delved into literature review, followed by the research design in section 3. The findings and analysis are presented in section 4. The conclusion, policy implications, recommendations, limitations, and direction for future studies are covered in section 5.

2. Literature Review

This section provides definitions of relevant concepts and codes of governance, the theoretical underpinnings, and empirical evidence from previous studies.

2.1 Definition of Corporate Governance Quality and Financial Performance

CG is a multifaceted concept without a single definition. Various bodies and prior scholars (Atugeba & Acquah-Sam, 2024; Ronoowah & Seetanah, 2022; OECD, 2021; SEC, 2020; Hillman & Dalziel, 2020; Biekpe & Adegbite, 2019; Elfeky 2017; Cadbury, 1999) have each assigned meaning to this important concept. It encompasses both the process of running a business and its goals, and identifies who is responsible, who wields power, and who makes decisions. In the context of contemporary organizations, the term "corporate governance quality" refers to the efficiency of governance mechanisms and practices in ensuring transparency, accountability, and ethical behavior (Adams, 2021). Some of the most important aspects include the independence of the board, the structures of executive compensation, the efficiency of the audit and risk committee, the protection of shareholder rights, and the adherence to regulatory standards. The alignment of management decisions with shareholder interests, the mitigation of agency conflicts, and the promotion of sustainable value creation are all critically dependent on the existence of high-quality governance frameworks (Sundaramurthy & Lewis, 2020; Amoako et al., 2020).

Concurrently, Financial performance is a subjective measure of how effectively a company uses its assets from its primary mode of operation to generate revenue (Antwi et al.,2022). financial performance metrics, including, return on equity, return on assets, and Tobin's-Q, are critical indicators of a company's operational efficiency and capacity to produce returns for its stakeholders (López-Iturriaga et al., 2020; Asiedu et al., 2019). Among these metrics, the return on assets (ROA) assists business leaders in measuring performance by calculating the return on a company's assets. When income is compared to a company's

total assets, it becomes clear whether the company can survive. ROA is the most straightforward measure of a company's performance because it shows how much a company earns with what it has (Atugeba & Acquach Sam, 2024) and it is not embedded with financial leverages.

2.2. Code of Best Practices and Compliance in Ghana

In Ghana, compliance and content of corporate governance frameworks have been refined by implementing a number of reforms. For example, the adoption of a new governance code (Securities and Exchange Commission Act,2020) and a new Company act,2019 (Act,992), along with directives from regulatory bodies such as the Bank of Ghana (BOG), Registrar of Companies, and the likes, have piloted in a new era of corporate rules and regulations intended to modernize the management of contemporary businesses in Ghana. This new era of corporate governance mandates the use of technology in the regulatory affairs of corporations, a rise in the responsibilities and qualifications of directors, the recognition of minority shareholder rights, and the introduction of a new concept known as "Beneficial ownership." This new concept is intended to increase openness in company profiles by disclosing the true owners' information, including politically exposed individuals (Companies Act, 2019(Act,992); SEC, 2020). In addition, guidelines on the Registration of Auditors and Accountants reporting for Public Companies and SEC Licensees are contained in SEC 2020 and to avert financial frauds, the Anti-Money Laundering Act 2020(Act, 1044) have been pushed into force.

Prior to this new development in Ghana, the SEC,2010 code of corporate governance and the Companies code,1963(Act,179) as well as other directives from regulatory agencies served as a benchmark for corporate governance assessment and its impact on businesses by numerous researchers in the recent past (World Bank 2010).

Undoubtedly, a long-standing guide to CG standards in Ghana is the OECD-like SEC's code of governance with the distinction of being the most comprehensive set of guidelines for effective corporate governance practices, which emerge in any transitional economy. Listed firms in Ghana stands to benefit from CG if they follow its guidelines in collaboration with the Ghana Stock Exchange Listing Regulations of 1990 and Companies code 2019, (Act, 992). The Companies Act applies to both public and private companies, but there are some special provisions for publicly traded companies only, such as financial reporting rules and procedures for appointing directors. The SEC's Code of Conduct applies to all publicly traded securities, especially on the Ghana stock exchange. The SEC governance code contains seven major sections: a) Shareholder rights; b) the mission, responsibilities and accountability of the board; c) committees of the board; d) relationship to shareholders and stakeholders e) financial affairs and auditing f) disclosures in financial reports and, g) code of ethics. Indicators from these seven areas, and other relevant standards such as Securities Industry Act 2016 (Act 929) and the Securities and Exchange Commission Regulations 2003 (LI 1728) are meant to be a benchmark for assessing corporate governance practices and quality level in Ghana (World bank 2020).

2.3. Theorical framework

To make sense of the dynamics of influencing firms' decision-making processes, a plethora of theories have attempted to map out the complex terrain of CG and FP. The BiOT (as developed by Edward P. Stabler Jr & Nancy A. Stabler in their paper titled: ‘Bidirectional Optimality Theory’ published in 1994) and Agency theory (Berle & Means, 1932) are two examples of such theories. Despite their differences in origin, they both provide interesting insights into the relationship between CGI (a proxy for corporate governance quality) and ROA (a proxy for financial performance) that can inform managerial and policy decisions. Linguists are familiar with BiOT, which proposes that in order to achieve optimal forms in

language, inputs and outputs are evaluated in both directions at the same time to shape competing constraints. In economics and management studies, agency theory is commonly applied to the complex Principal-Agent relationship that exists within firms (Fama & Jensen, 1983; Jensen and Meckling, 1976). It is worth mentioning that most previous researchers have utilized agency theory to explore ways to resolve conflicts of interest between shareholders and management in order to drive firm profitability (Atugeba & Acquah-Sam,2024; Ronoowah & Seetanah,2022; Hillman and Dalziel,2020; Arora & Bodhanwala,2018). However, there is limited information available regarding the use of BiOT to address these types of conflicts. As a result, the CG-FP discourse develops a theoretical void. This study argues that, in spite of their apparent differences, agency theory and BiOT have common ground on concepts that are deeply relevant to corporate governance: optimizing linguistics output within constraints and resolving conflicts. This convergence raises the intriguing possibility of a synergy between the two theories' respective frameworks, which aim to optimize efficiency and profitability in corporate settings (Alley et al.,2016). Through the integration of these viewpoints, this research aims to shed light on unexplored avenues for comprehending the complex interplay between governance processes and the financial success of modern businesses.

To put it simply, according to bidirectional optimality theory (BiOT), there is a two-way street connecting good corporate governance with financial success. In other words, better financial results are the result of better governance practices, and companies can keep and raise their governance standards if they do well financially (Hermalin & Weisbach, 2020). This theoretical framework proposes that, rather than relying on one another, optimal financial performance and governance can be attained through a process of continuous improvement in both angles (Ronoowah & Seetanah, 2022). To summarize, the theoretical emphasis outlined above emphasizes the importance of CG compliance in driving FP across diverse institutional context. By applying bidirectional optimality theory, it provides a more in-depth understanding of the complex dynamics of how CG contributes to value creation and vice versa in not only developed economies, but emerging economies as well.

2.4. Empirical Review: Corporate Governance Quality and Financial Performance

The literature on developing a corporate governance index or quotient and subsequently assessing the direction of its relationship with financial performance is scarce, with the work of Atugeba & Acquah-Sam(2024); Ronoowah & Seetanah(2022);Arora & Bodhanwala(2018), Ararat et al. (2016), Black et al. (2019), Sarkar et al. (2012), Gompers et al., (2003), Ntim et al. (2012) and Tsamenyi, Enninful-Adu, and Onumah (2007) and among others representing some of the most notable efforts made in different jurisdictions, including Ghana.

Ronoowah and Seetanah (2022) used a non-weighted scoring index approach to assess the CG practices of 42 sampled firms listed on SEM between 2009 and 2019. They relied on 102 governance provisions enshrined in the Mauritanian code of CG. The results showed that listed Mauritian firms are highly compliant, with a respectable CGI of 89%. Furthermore, they used the PVAR model to investigate the interrelationship and interdependence of CG, FP, and capital structure (CS), and their findings revealed a strong bidirectional causality with varying signs among the variables of interest.

Also, Arora and Bodhanwala (2018) investigated the link between corporate governance index (CGI) and business performance in India using a panel data set from 407 listed firms on the Bombay Stock Exchange between 2009 and 2014. They discovered a significant positive relationship between CGI and firm performance metrics, and they went on to explain that CGI is an important and causal factor in explaining

firm performance, and as a result, investors will have a positive perception of business firms that maintain high governance standards, lowering funding costs.

Again, Black et al. (2019) examined four markets (Turkey, Korea, India, and Brazil) and developed a country-specific governance index. The global sub-indices used by them include disclosures, board structure, ownership structure, shareholder rights, board processes, and related party transaction control. Their results indicate that financial disclosures predict a greater market value across all selected nations, with board structure, board independence having a positive coefficient in all selected countries, but only being significant in two. However, ownership structure, board procedures, and the regulation of related-party transactions have little bearing on the value of a company. Similarly, Ararat et al. (2016) conducted their seven-year study in Turkey on the impact of corporate governance on business value and profitability (2006-2012). Their research was based on five sub-indices, which included shareholder rights, board structure, board procedure, disclosure, and ownership, and using a fixed effect model, their research revealed that the Turkey corporate governance index (TCGI) influences higher market value, while random effects within firms contributed to higher firm-level profitability.

Further, Sarkar et al. (2012) also constructed a corporate governance index for the 500 largest companies in India considering the 2003-2008 study period. They rely on four important corporate governance themes: Structure of ownership, Audit committee, board of directors, and external auditors. They discovered an upward trend in the governance index of Indian companies and established a high and positive correlation between the corporate governance index and the market performance of corporations. Furthermore, Gompers et al. (2003) created a governance index (G) utilizing 1500 companies from 1990 to 1998. They examined business takeover defenses for 24 governance rules as a proxy for shareholder rights. In constructing the G-index, they adopted a non-weighted scoring approach, and gave one (1) point for the presence or otherwise zero (0) for absence of each provision. Their study employed sub-indices such as: Delay, Voting, Protection, state, and others as their main themes.

On the African continent, few efforts have been made to create a corporate governance index to assist stakeholders in making economic and investment decisions. Ntim et al. (2012), for instance, employed a sample of 169 South African companies from 2002 to 2006 and 50 corporate governance provisions based on South African corporate governance code known as King II. They relied on five major themes, including board, directors, and ownership; accounting and auditing; risk management, internal audit, and control; integrated sustainability reporting, and compliance enforcement. The survey revealed that, on average, 69 percent of the 50 provisions of the King II code of governance were adhered to by the studied listed companies.

Specifically, to Ghana, Atugeba & Acquah-Sam (2024) studied the relationship between CG and FP with the moderating role of national governance quality using 31 listed firms on the GSE from 2013- 2022. They discovered that CG practices adversely affect the level of FP, but with the compliance to national governance and institutional framework, plays a significant role between CG and FP in Ghana. Also, Owusu-Tawiah et al. (2021) investigate the level and quality of corporate governance disclosures among firms listed on the Ghana Stock Exchange (GSE). Their study discovered that while there has been progress in governance disclosure practices, there are still gaps in the comprehensiveness and consistency of disclosures across firms. This is because the awareness and education of the SEC governance code remains weak in the Ghanaian business landscape. Similarly, Owusu-Frimpong and Amoako (2019) explore how board characteristics, such as board size and composition, influence firm performance metrics such as profitability and market valuation. They argue that while Ghanaian firms have made progress in

adopting governance reforms, challenges such as regulatory enforcement and board effectiveness continue to affect governance outcomes and financial performance. Conversely, Biekpe and Adegbite (2019) in their study, underscores the positive impact of governance attributes such as board independence and audit committee effectiveness on firm profitability in African economies, including Ghana. Their findings highlight the role of regulatory compliance and governance transparency in driving financial performance improvements.

Asiedu et al. (2019) investigate the relationship between CEO duality and firm performance in Ghana, finding mixed results depending on firm size and industry dynamics. Their study suggests that separating the roles of CEO and board chairperson may enhance governance effectiveness and transparency, thereby positively impacting financial performance metrics over time. Largely, Comparative analyses by Ghanaian scholars across different regions and industries provide insights into how governance reforms tailored to local contexts can enhance organizational resilience and competitiveness in emerging markets (Sarpong-Danquah et al.,2022; Musah & Adutwumwaa,2021; Gyamerah, Amo & Adomako, 2020; Puni & Anlesinya, 2020).

Quite distant from more current research, Tsamenyi, Enninful-Adu, and Onumah (2007) developed a corporate governance index to analyse the level of compliance among 22 listed companies in Ghana between 2001 and 2002. The average score for disclosure and transparency stood at 52%. Subsequently, a detailed country assessment of Ghana's corporate governance framework in relation to the OECD principles of corporate governance ware conducted by the World Bank (2010) and revealed that Ghana scored 75 percent for shareholder rights, 61 percent for equitable treatment of shareholders, 62 percent for disclosure, 43 percent for responsibility of the board, 61 percent for regulatory framework, and 68 percent for equitable treatment of stakeholders. As a result, it was recommended that boards can strengthen their corporate governance procedures in all six indicated areas in order to benefit from strong business performance.

From the above review, it appears that, with the exception of Tsamenyi et al. (2007) who even limited their study to some segment of SEC governance code without a holistic assessment of Ghana's corporate governance compliance level, neither previous nor recent studies have examined the entire provisions enshrined in the SEC governance code of best practices in terms of assessing the level of compliance among Ghanaian listed firms, thereby creating a literature gap. In response to this deficiency and in line with previous research, the initial purpose of this study is to rely on the 144 provisions partitioned into all the 7 sections (See Table 1) of the SEC code of best practice to construct Ghana's corporate governance index (GCGI) as a first-time study, and also, to reflect modern day compliance level of corporate governance practices to aid policy framework and investment decisions in Ghana. Further, the above studies demonstrate that little or no knowledge exists about the bidirectional causation between corporate governance quality and financial performance in Ghana, resulting in a knowledge gap. However, there is ongoing debate about the nature of the causal relationship between corporate governance disclosure quality and firm financial performance in order to gain a better understanding of the underlying dynamics of economic-based corporate governance. For this reason, and for the purpose of this study's second objective, the study relied on the dynamics of previous studies, as well as the theoretical underpinnings, to establish the following null(H_0) and alternative hypothesis ((H_1):

H_0 : There is a bidirectional causation between CG-quality and FP in Ghana.

H_1 : There is no bidirectional causation between CG-quality and FP in Ghana.

3. Methodology

The purpose of this study was to create a corporate governance index (CGI) as a proxy for the quality level of governance practices in Ghana, as well as to investigate its causal relationship with financial performance among Ghanaian listed firms. Specifically, this section delves into the study's data collection and sample size determination, unit of analysis and timeframe, CGI measurement, GMM-styled PVAR models and the statistical package used for the analysis.

3.1. Data and Sample Size

As of December 2021, all the 37 listed firms on the GSE were included in the study population. Out of all these listed companies, twenty-nine (29) were specifically chosen as a study sample based on companies' operational presence in Ghana and the availability of complete accounting and financial data sourced from the GSE website for the 2010–2021 study period. The data are collected manually from the annual reports and board charters of the sampled firms. In order to achieve short balanced panel(N>T) financial reports prior to 2010 are excluded due to unavailability of data for all the 29 firms. The data-set date ended in 2021 because of the domestic debt exchange program, which negatively impacted almost all firms' financial results in 2022(Ghana). In line with the literature, balanced data ensures that data is not skewed towards certain firms at the expense of others to create an unhealthy bias (Gujurati, 2013). The deliberate inclusion of both financial and non-financial sectors was intended to ensure that the study's findings are broadly applicable.

The study created a corporate governance index with 144 questions based on the SEC's corporate governance principles. The 144 questions are organized around the seven principles outlined in the SEC governance code. Viz: a) Shareholder rights; b) the mission, responsibilities and accountability of the board; c) committees of the board; d) relationship to shareholders and stakeholders e) financial affairs and auditing f) disclosures in financial reports and, g) code of ethics. The full segmentation is attached in Appendix A. Table 1 contains detailed information about the variables, denotation, measurement style, and respective sources of reference

3.2 Variable Measurements

3.2.1. Construction of Corporate Governance Index (CGI)

The computation of a governance index using the Ghana SEC governance code involves assessing several key indicators across listed companies to evaluate their adherence to robust governance practices. These indicators encompass various aspects of corporate governance, starting with the composition and independence of the board of directors, including the presence of independent directors and the effectiveness of board committees such as audit, remuneration, and nomination committees. The evaluation also considers the board's responsibilities and accountability, focusing on its oversight of strategic decisions, CEO duality, risk management frameworks, and financial performance. Transparency and disclosure play a crucial role, examining the quality and timeliness of financial reporting, disclosure of related-party transactions, and transparency in executive compensation practices. Additionally, indicators cover shareholder rights and treatment, ensuring the protection of shareholder interests and mechanisms for engagement. Ethical standards and conduct are assessed through adherence to codes of ethics, prevention of conflicts of interest, and integrity in decision-making processes. Effective risk management and internal controls are evaluated for their ability to safeguard company assets, complemented by compliance with legal and regulatory frameworks, including the Ghana SEC governance code itself. Stakeholder relations, corporate social responsibility initiatives, and a commitment

to continuous improvement in governance practices round out the indicators, providing a comprehensive assessment framework for evaluating governance standards and fostering transparency, accountability, and sustainability in Ghana's listed companies.

A non-weighted scoring method was used, with most attributes coded as '1' if a firm has the attribute, and '0' otherwise. This approach is consistent with the prior empirical studies (Ronoowah and Seetanah ,2022); Nsoar & Al-Rjoab,2021; Barako,2007). The non-weighted approach assigns equal weighting to each of the 144 expected disclosure items. The rationale is to avoid subjectivity bias pave way for objective analysis of data. The CGI was computed as follows:

$$CGI_j = \frac{T=\sum_{i=1}^{n} d_i}{M=\sum_{i=1}^{m} d_i} \ldots\ldots\ldots\ldots (M1)$$

Where CGI_J= the total disclosure score under a sub-index for each company(j) which lies within $0 \leq CGI_J$ 144. T=$total\ number\ of\ items\ discclosd$ ($d\ i$) by company j under a sub-index. M = represents the maximum number of disclosure items for company j that could have been disclosed under a sub-index.

The overall CGI for Ghana is then calculated as an average of the seven (7) sub-indexes deduced from M1 above.

3.2.2 Financial Performance (FP)

In corporate governance literature, different perspectives on financial performance metrics have been used to proxy financial performance for corporate entities. In this study, the researcher believes that return on asset (ROA) is a measure of financial performance because it indicates how profitably a business's assets create revenue (Tornyeva & wereko, 2012). The use of ROA is justified because it appears to be broadly compatible with recent studies (Atugeba & Acquah- Sam, 2024; Puni & Anlesinya,2020; Amartey, Amartei & Osita, 2019; Owusu & Wier 2018). For this study, the ROA was calculated as follows:

$$ROA_{it} = \frac{EAT_{it}}{TA_{it}} \ldots\ldots\ldots\ldots (M2)$$

Where EAT_{it} shows profit after tax for firm *i* in year *t*, and TA_{it} also refers to total assets for a firm *i* in year *t*.

Profit After Tax (*PAT*), which is essentially the net income available to shareholders after deducting all expenses, including taxes, is a widely accepted measure of profitability in financial analysis hence its use for this study. According to Brigham and Houston (2012), net income (or *EAT*) is considered a comprehensive measure of a firm's operating performance because it reflects the total earnings generated from operations after accounting for all costs and taxes. Using *PAT* ensures consistency in financial reporting across firms and industries, making it easier to compare the financial performance of different companies. This consistency is crucial for investors, analysts, and regulators in evaluating the financial health and performance of companies (Bodie et al., 2014).

Table 1: Variable description, denotation, measurements style and reference

Variable(s)	Denotation	Measurement Style	Reference
Corporate governance Index	CGI	An average of the seven (7) sub-indexes deduced from M1 above.	Barako, 2007
Financial Performance	ROA	See M2(section 3.2.2)	Atugeba & Acquah-Sam, 2024

SEC Corporate Governance Principles			
Shareholder Rights	SHrT	See M1(section 3.2.1)	SEC Code/Annual reports
Mission, Resp.& Acc. of the Board	MRaB	See M1(section 3.2.1)	SEC Code/Annual reports
Committees of the Board	CoB	See M1(section 3.2.1)	SEC Code/Annual reports
Relationship to Shareholders and Other Stakeholders	RSS	See M1(section 3.2.1)	SEC Code/Annual reports
Financial Affairs & Auditing	FAA	See M1(section 3.2.1)	SEC Code/Annual reports
Disclosore in Financial Reports	DFR	See M1(section 3.2.1)	SEC Code/Annual reports
Code of Ethics	CoE	See M1(section 3.2.1)	SEC Code/Annual reports

This approach is supported by accounting standards and ensures that the financial statement accurately reflects the financial impact of taxes on the firm's profitability (Brigham and Ehrhardt, 2013).

In conclusion, Profit After Tax (*PAT*) is justified for computing Return on Assets (ROA) because it provides a comprehensive measure of profitability that considers all expenses, including taxes, thereby reflecting the true earnings available to shareholders. This approach ensures consistency, comparability, and accuracy in financial analysis, making it a widely accepted metric in both academic research and practical financial decision-making.

3.2.3 PVAR Model Specification and Estimation Technique

To achieve the second objective of this study, the PVAR model developed by Holtz-Eakin et al. (1988) and now widely used by prior scholars for economic and financial research (Ronoowah & Seetanah, 2022; Ambala & Anarfo, 2022; Blankson et al., 2021; Hillman & Dalziel, 2020; Love 2011) contingent on the recommendation by Abrigo & Love (2016).

The PVAR methodology is a revolutionized algorithm that sought to model set of variables emanating from firms of different sectors (financial and non-financial) with varying characteristics such as firm size, firm age, regional differences, industry type and listing status without any challenge of firm-specific heterogeneity (Ronoowah & Seetanah,2022). Indeed, the PVAR approach works with only endogenous variables and it excludes control variables (Apostolakis &Papadopoulos, 2019).

The general specification of the PVAR estimation used for this study is as stated below(M3):

$$Y_{i,t} = a_0 + \sum_{K=1}^{K} B_{i,k}\, Y_{i,t-k} + \sum_{K=0}^{K} Q_{i,k}\, X_{i,t-k} + U_i + \in_{i,t} \quad \ldots\ldots\ldots\ldots (M3)$$

Where $Y_{i,t} = Dependent\ Variables\ for\ groups\ i$, $X_{i,t} = (k * 1)$ = vector of explanatory variables of group i and B_(i ,k) and Q_(i,k)=(k*1) being coefficient vectors. Groups are denoted by i= 1,2……N, while time periods by t=1,2…...T. U_i = fixed firm-specific unobserved heterogeneity, $\in_{i,t}$= the stochastic error term, and a_0= constant term as well as k being the lag value. It is imperative to note that PVAR works with lags (Hansen,1982)

M3 can, however, be separated and read together as *M4a* and *M4b* to conveniently reflect the simultaneous interplay of the two variables of interest. The breakdown of M3 is as follows:

$$Y_{it} = \sum_{K=1}^{K} B_{i,k}\, Y_{i,t-k} + \sum_{K=1}^{K} Q_{i,k}\, X_{i,t-k} + U_i + \in_{i,t} \ldots\ldots\ldots\ldots\ldots (M4a)$$

$$X_{it} = \sum_{K=1}^{K} B_{i,k}\, X_{i,t-k} + \sum_{K=1}^{K} Q_{i,k}\, Y_{i,t-k} + U_i + \in_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots (M4b)$$

Where, specifically, Y_{it} refers to ROA for firm i , in year t, X_{it} represents CGI for firm i, in year t. As indicated earlier, PVAR works with lags, as well as endogenous variables (Blundell & Bond, 2005). Which lag is optimal? This is an empirical matter. Therefore, the study adopted the three maximum likelihood selection criteria (MIC, MAIC, MIHC) recommended by Andrews and Lu (2001) to choose the optimal lag guided by the minimum telepathy value of (MBIC, MAIC, MIHQ). The idea is to balance the fit of the model with the number of parameters in the model aimed at minimizing the variance of the estimated coefficients (Hansen, 1982).

The PVAR model is justifiably employed to test the bidirectional optimality theory by fitting a multivariate regression of each dependent variable(ROA_{it}, or CGI_{it}) on lags of their respective selves (ROA_{t_k} or CGI_{t_k}) and also, to address issues relating to endogeneities between the variables in the model (Antonakais et al.,2020). Indeed, equation M3 is implemented in stata (V.15) for the needed results.

From the empirical literature (Abrigo & love, 2016) of PVAR analysis, a significant joint null($=\in_{B,O}$) can be deemed as evidence of granger-causality between ROA and CGI in Ghana or otherwise, while the sign of the joint null denotes the direction of causality (Blankson et al.,2021). After generating the VAR coefficients, the impulse response function (IRF) and the forecast error variance decomposition (FEDV) are deduced on the basis of 200 Monte-Carlo simulation. The IFR offers a pictorial view of the direction of causality between ROA and CGI in Ghana, but unable to tell the magnitude of shocks emanating from ROA to CGI and from the latter to the former (Abrigo & love, 2016). For the stability and validity of the PVAR model for this study, the modulus of eigenvalue of the estimated model is calculated, and the VAR model is stable when all the modulus is less than one (1) or the variables lie inside the unit circle (Lutkephl,2005). The FEDV provides the magnitude of shocks from both angles of the set variables of interest.

4.0.Empirical Results and Discussions

4.1. Descriptive Statistics

Table 2 reflects on the statistical properties of the main and other variables. It provides information relating to values of mean, standard deviation, maximum and minimum estimations from the 29 sampled firms.

Table 2: Descriptive Statistics- C G Structures and FP of Firms Listed on GSE

Variable	Obs	Mean	Std. Dev.	Min	Max
SHrT	348	71.292	14.006	31	91
Mrab	348	67.978	13.815	12.863	93.804
CoB	348	71.974	12.28	18.647	98.134
RSS	348	73.358	11.907	42.44	94.134
FAA	348	74.082	10.605	30.33	97.636

DFR	348	67.397	15.356	17.407	90.56
CoE	348	66.23	13.909	4.483	99.558
CGI	348	64.868	10.215	4.035	88.45
ROA	348	35.577	24.634	-196.25	113.263

Table 2 displays the outcomes of the descriptive statistics. It displays the overall corporate governance compliance level (CGI), return on assets (ROA), and the seven (7) corporate governance structures as defined by the SEC governance code (Ghana). The mean CGI value is 64.9 percent. It can be inferred that, on average, these firms have a relatively high level of adherence to SEC corporate governance principles. However, the exact nature and quality of governance practices can vary widely across individual firms. In this vain, investors may use this information to gauge the risk associated with governance practices in Ghanaian firms they consider investing in, as stronger governance typically correlates with lower risk and better long-term performance. The CGI ranges from 4 % to 88.4 % across the 29 sampled Ghanaian listed firms over the study period. This indicates the variability in corporate governance practices among these firms, with some scoring relatively low (4%) and others scoring quite high (88.4%). The wide range from 4 % to 88.4 % indicates significant diversity in corporate governance practices among Ghanaian listed firms. This variability could reflect differences in corporate structures, policies, regulatory compliance, and management practices.

The standard deviation is 10 %. This measures the dispersion or spread of the CGI scores around the mean. A higher standard deviation indicates that the CGI scores are more spread out from the mean of 64.9%. In this case, a standard deviation of 10 percent suggests that most firms' CGI scores vary within a range around the mean, with some firms having scores that are higher or lower by approximately 10 percent.

Policymakers and regulators can use this report to assess the overall state of corporate governance in Ghana and identify areas for regulatory intervention or improvement initiatives as these statistics provides a benchmark for evaluating individual firms' governance practices against the average and understanding where improvements might be needed.

The average return on assets (ROA) is 35%. This does not bode well, as it is indicative of management's inability to effectively leverage the economic resources at their disposal to produce adequate returns for shareholders and other stakeholders.

4.2. PVAR Results and Discussions

To discuss the results of PVAR estimations, it's important to provide a comprehensive overview that includes diagnostics like stationarity tests and other preliminary tests (Andrews & Lu, 2001; Hansen ,1982) to ensure data properties, and also, post-estimation test. These steps help ensure the robustness and reliability of the PVAR model's results for decision-making and further analysis (Abrigo & Love, 2016)

4.2.1 Unit Root Test

The Fisher-type unit root test and the Augmented Dickey- Fuller test demonstrate stationarity in the data series of the two variables under consideration, as evidenced by P-values less than 5% and 1% respectively at level of statistical significance (**see table 3 below**). In this regard, the researcher rejects the null hypothesis of non-stationarity and conclude that the variables of interest are stationary at level. Given the

lack of a unit root in the data series, the causation between these two variables can be investigated at the level.

4.2.2 Lag Optimal Structure

In a PVAR analysis, selecting the lag order is crucial for correctly modeling the dynamics among variables. As indicated earlier, it stands to be an empirical matter. **Table 4 below**, shows that lag one (1) follows the consistent moment by disclosing the critical minimum value for MBIC, MAIC and MQIC (Andrews & Lu, 2001) with a corresponding maximum value of Hansen (1982) J- over identified restrictions. That is to say, the first-order PVAR is the preferred model for this study due to evidence of smallest value of MBIC, MAIC and MQIC at the level where Hansen's J is maximized.

Table 3: Panel Unit Root Test Result (Fisher's type preferred)

Variables	Phillip- Peron Test		Aug. Dickey Fuller	
	t	P-Value	t	P-value
Corporate Governance (CGI)	59.65	0.014	15.23	0.0000
Financial Performance (ROA)	212	0.0000	35	0.0000
Panel B: First Difference				
Corporate Governance (CGI_1)	93.53	0.000	8	0.0000

Table 4: Lag Optimal Structure

Lag	CD	J	J- Pvalue	MBIC	MAIC	MQIC
1	. 7642	12.7363	.3885	-45.9479	-11.2637	-25.3580
2	. 7718	11.1669	.1924	-27.9559	-4.8306	- 14.2293
3	-.1916	5.15167	.2721	-14.4097	- 2.8483	- 7.5464
4	-. 4041	-	-	-	-	-

By implications, selecting lag order one implies that the PVAR model captures the immediate effects of changes in corporate governance practices on financial performance metrics. This choice facilitates a more precise understanding of how corporate governance dynamics influence short-term financial outcomes, aiding in strategic decision-making and policy formulation.

4.2.3 Granger Causality Test between CG and FP in Ghana

Table 5 presents the PVAR results using the GMM-styled model recommended by Abrigo & Love (2016). The causality test affirms a bidirectional nexus between CG and FP among Ghanaian listed companies. It shows that CG positively granger-causes corporate FP at a 1% level of significance(p=0.001) and in the same manner, FP also granger causes CG at 5% significance level. Indeed, this result supports the bidirectional optimality theory which postulates that an improvement in CG will lead to a rise in FP and vise-versa. The findings however, contradicts the opinion of prior scholars (Sarpong-Danquah et al.,2022; Puni & Anlesinya, 2020) who discovered that a unidimensional relationship exist between CG and FP in Ghana. Causality is statistically significant, indicating that the relationships observed by this study are unlikely to be due to random chance. This robustness supports the notion that corporate governance dynamics and financial performance metrics interact in meaningful ways within the studied context. These findings underscore the importance of considering both corporate governance mechanisms and financial

performance metrics simultaneously in policy-making and strategic decision-making processes. Understanding the causal relationships helps in designing effective governance structures that can enhance financial outcomes and vice versa.

Table 5: Granger - Causality Test				
Estimation Results - CGI and FP Nexus (Bidirectional)				
Variables	**VAR Estimation Results**		**Granger - Causality Wald Test**	
	Coff.	***P-value***	**Test Statistic**	***P- value***
Panel A: CGCL (Dependent Variable)				
Independent Variables:				
Lagged Corporate Gov. (CGI_1)	0.5O4	0.002		
Lagged Financial Perf. (ROA_1)	2.18	0.001		
Financial Performance (ROA)			3.39	**0.001*** **
Panel B: ROA (Dependent Variable)				
Independent Variables:				
Lagged Financial Perf. (ROA_1)	0. 515	0.012		
Lagged Corporate Gov. (CGI_1)	0.104	0.025		
Corporate Governance Compliance			2.256	**0.025** **
5% significance level.				

4.2.4 Stability Test

Eigenvalues are an important part of the PVAR estimation process. These values indicate the stability of the PVAR model used for a given study. The table and pictorial view of eigenvalues in table 6 and fig.1 show that the estimation is stable, as the modulus of the eigenvalues is less than one (∂<1), and fig.1 corroborates it with the fact that all the values are shown inside a unit circle. According to Lukepohl (2005), the stability condition is required for VAR estimation; otherwise, the deduced results may be considered inconsistent and unreliable. By implication, the results show that the model used in this study adequately captures the dynamics of corporate governance and financial performance without misspecification or instability

4.2.5 Specification Test

This study uses the Cholesky Impulse Response Function (IRF) and the Forecast Error Variance Decomposition (FEVD) on the basis of 200 Monte- Carlo simulations to examine the impact of exogenous changes in each of the endogenous variables used in the PVAR system. Table 7 and fig. 2 reflects the FCVD and IRF respectively. Earlier, the results in table 6 confirms the stability condition of the specifications for this study as seen in apparent manner that, the modulus of each eigen value depict values which ware less than one, and in support of this assertion, the unit root companion matrix (fig. 2) shows that all the roots lie within the unit circle. This observation agrees with prior scholars such as Nsor-Ambala & Bugri-Anarfo (2022) and Blankson et al. (2021).

To assess the nature and magnitude of impact between the two variables under consideration, whist IRF (fig. 2) offers a pictorial view of how changes in one endogenous variable causes changes(shocks) in the other and vice versa, FEVD (table 7) provides the magnitude(width) of the shocks against each other over time. As can be inferred, the Granger causality Wald test results (table 5) together with the time path of impulse response(fig.2) provides the robust statistical evidence for the existence of positive bidirectional causation between CG and FP in the context of Ghanaian listed firms over time.

Table 6: Stability Condition Test

Eigenvalues Stability Condition		
Real Eigen Value	Imagery Eigen Value	Modulus
0.522	0	0.58
0.188	0	0.43
	0	0.38
	0	0.29

Fig. 1

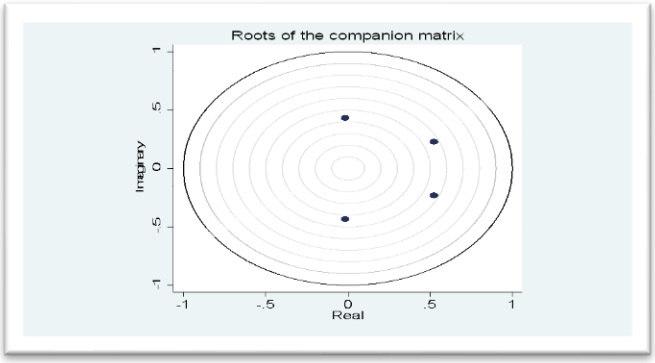

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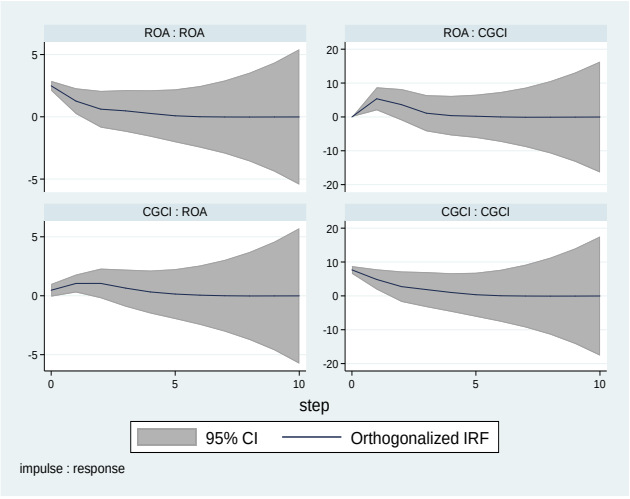
Table 7: Forecast error Variance decomposition (FEVD)

Response variable and Forecast horizon	Impulse variable CGCI	Impulse variable ROA
CGCI		
0	0	0
1	1	0
2	.7409935	.2590065
3	.6819489	.3180511
4	.6839595	.3160405
5	.6855556	.3144445
6	.685614	.314386
7	.6856171	.3143829
8	.6855826	.3144174
9	.6855628	.3144371
10	.6855592	.3144408
ROA		
0	0	0
1	.0339587	.9660413
2	.1433879	.856612
3	.2274025	.7725975
4	.2517233	.7482768
5	.2567972	.7432027
6	.2579838	.7420162
7	.2581343	.7418656
8	.2581301	.7418699
9	.2581404	.7418596
10	.2581522	.7418479

Fig.2: Impulse Response Function (IFR)



The IRF (fig.2) demonstrate a positive bidirectional causality between CGI and FP. This is **seen** in the top-right and downward -left quadrants of the IFR outcome. To make sense to this pictorial view, FEVD (table 7) offers the explanation. That is, as shown in table 7, whilst CGI responds to 74% to its own lags in the 10th year, the variations in CGI explains 26% on average in the changes of FP in all firms in Ghana. On the contrary, whilst FP responds to changes in its own lags by 26% on average, it causes changes(shocks) in CGI by 74% among Ghanaian listed firms. In this respect, the most endogenous variable for this study is the CGI. By implication, mangers and investors can gauge the potential benefits of investing in robust CG practices by assessing the long-term implications revealed by IRF and FEVD

analysis. This therefore supports the bidirectional optimality theory by submitting that a positive simultaneous interplay exists between CG and FP in Ghana.

5. Conclusion

The purpose of this research is twofold: first, to develop an index of corporate governance (CGI) in accordance with Ghana's corporate governance code; and second, to examine the relationship between CGI and financial performance (FP) in relation to 29 companies that were publicly traded in Ghana between 2010 and 2021; to find out which way CGI and FP were causally related, several statistical procedures were employed.

With an average percentage score of 64.87%, the study achieved its first objective of developing a governance index to show the extent to which CG practices are present in Ghana. The score suggests that Ghana's corporate governance practices are moderately effective. This could mean that some companies follow good governance standards, but overall, there's space for improvement in terms of ethics, transparency, and accountability in Ghana's corporate world. Corporate governance indices are a common tool for investors to evaluate the potential dangers of investing in a certain market. Investors may be influenced by Ghana's moderate level of corporate governance risk, as indicated by its score of 64.87 percent, when making investment decisions or negotiating terms.

With the second objective of establishing whether there is bidirectional causation between CG and FP among Ghanaian listed firms, the analysis started with the examination of stochastic properties of each variable data series by testing their stationarity via Fisher's Peron test. The test revealed that both CG and FP are stationary at level. The essence of this test is to generate reliable coefficients and also avoid spurious regression. Then after, Granger-causality was performed which shows that in Ghana, bidirectional causality exists between CGI and FP. That is, causation runs from CG to FP and also, from FP to CG. This result indicated that CG depends on FP and FP also depends on CGCL in Ghana. Further, the VAR analysis carried out at lag 1-4 of the data series revealed that VAR lag 1 selection order criterial was at minimum with MBIC, AIC and MQIC at -45.95, -11.26 and -25.36 respectively (see, table 4). These results further provide evidence that bidirectional evidence exist between CG and FP can be explained by VAR model at lag 1 (ie. VAR (1)). The effects of stochastic shocks to CG are explored using impulse response function (IRF) graph (fig.2). The pictorial evidence from the impulse response function graph shows that corporate governance compliance level is sensitive to financial performance, and financial performance is also sensitive to corporate governance compliance level in Ghana. Overall, the Granger causality Wald test results, the lag one structure and, the IRF provides a robust statistical evidence for a positive bidirectional correlation between CG and FP in Ghana.

This study adds to the existing economic-based corporate governance debate by employing the PVAR model, which has the potential to deal with endogeneity issues caused by endogenous interactions between CG and FP, and, to the best of the researcher's knowledge, this is the first time PVAR has been used to examine the CG and FP nexus in Ghana. Furthermore, the analysis presented in this study has the potential to benefit policymakers, managers, and investors alike. The empirical results of this study, for example, show that weaknesses permeate through board missions and responsibilities, which could most likely be due to lack of adequate knowledge about Ghana's SEC code of governance (World bank 2010). This study recommends that board chairpersons ensure that board members consistently upgrade their skills and knowledge in order to carry out the board-related tasks outlined in the SEC governance code. This is because good corporate governance practices promote transparency, which leads to improved financial

performance. When it comes to countries with good corporate governance, both foreign and domestic investors can use the corporate governance metric developed for Ghana in this study to help them decide. Variably, this study has shed light not only on the relationship between CG and firm FP, but also on the magnitude, direction, and type of causation between these two important variables. This finding reinforces the importance of corporate governance by providing empirical evidence that a firm can benefit economically from high corporate governance standards and vice versa, but not in substitution. In Ghana, the majority of previous CG studies exaggerate agency theory, which has been criticized for failing to comprehensively explain the corporate governance-financial performance nexus, both of which are multidisciplinary concepts. This study adds to the existing literature by investigating the corporate governance-financial performance nexus through the lens of bidirectional Optimality theory for the first time, allowing us to better understand the nuanced dynamics of the CG and FP nexus in emerging markets like Ghana. Policymakers and managers can use the FEVD to help prioritize interventions and strategies that address the most influential factors driving CG and profitability results.

However, the current study has some limitations. This study used quantitative analysis as a methodological technique; however, given the sensitive nature of corporate governance, future research may employ alternative approaches to support or refute the study's findings. It is also worth noting that the use of the PVAR to assess the bidirectional nexus between corporate governance compliance and financial performance lacks the ability to demonstrate the short and long run effects of this significant relationship; thus, future research should use the Vector Error Correctional Method (VECM) to address the short and long run effects of the aforementioned nexus. Furthermore, because measuring the corporate governance compliance index is a subjective process, different researchers will undoubtedly have different rates and perspectives on corporate governance compliance items in Ghana and elsewhere. This study's corporate governance compliance index was made up of 144 elements organized into seven categories. The study's findings may vary depending on how many or few elements are included. Because there is no universal index for measuring corporate governance disclosures (Barako, 2007), future researchers studying the same population may find similar or disparate results. Bidirectional optimality theory and agency theory serve as the theoretical foundation for this study. Additional research into economic-based corporate governance through the lens of other theories, such as the theory of positive economies, impression management theory, and sociological theories, among others, would provide an interesting new perspective on the existing literature. Future research can investigate the dynamic relationship between CG, FP, and tax compliance.

List of Acronyms

Acronyms	***Full Meaning***
CG	Corporate Governance
FP	Financial Performance
ROA	Return on Assets
BiOT	Bidirectional Optimality Theory
PVAR	Panel Vector Autoregression
MAIC	Akaike Information Criterion (AIC)
MBIC	Bayesian Information Criterion (BIC)
MQIC	Quasi Information Criterion (QIC)
GDP	Gross Domestic Products

Data Availability Statement

Data for this study was obtained from publicly available sources and can readily be made available upon reasonable request from Enoch k Akuffu-Djobi (Corresponding author).

Contribution Statement

While the unidirectional nexus of corporate governance (CG) and financial performance (FP) has been extensively researched, the bidirectional relationship between these key variables has received less attention in the annals of economic-based CG studies in emerging economies such as Ghana. As a result, this study examines the dynamic interplay between CG and FP using bidirectional optimality theory. By doing so, this study adds a new dimension to our understanding of the CG and FP nexus by demonstrating empirically that these two concepts interact concurrently in Ghana, providing useful information to policymakers, business organizations, and the investing public. It will help academics and regulators better understand the nature and direction of the relationship between CG and FP, guiding future studies and policy formulation in the coming years. Finally, the findings of this study would promote a culture of responsibility, fairness, and accountability toward stakeholders within the corporate landscape, thereby increasing investor confidence in Ghana.

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