UNIVERSITY OF CAPE COAST

BANKING SECTOR FINANCIAL SOUNDNESS AND STOCK RETURNS IN GHANA

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BY

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis 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: Doreen Oppong

Supervisor's Declaration

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

Supervisor's Signature: …… Date: ……

Name: Prof. Samuel Kwaku Agyei

ABSTRACT

The emergence of the financial crisis in the past years together with the movement of international capital flows poses a significant threat to the financial soundness of the banking sector, stock market, and the economy. This adds up to other fundamental problems such as banks' inability to provide long-term capital and the long-term volatility of Ghana's financial sector. Accordingly, this study examined the effect of banking sector financial soundness (CAR, CLASL, CLATA CD, NPL, ROA, and ROE) on stock returns (GSECI and GSEFSI) as well as the causality between them. Pertinent to that, the quantile regression approach and conditional causality in quantile are utilised from January 2011 to December 2022 in the Ghanaian context. The study found the banking sector's financial soundness indicators to have both positive and or negative effects on the quantile distributions of GSECI and GSEFSI. In addition, CAR was found to have a forecasting ability on the GSEFSI, while CD had a forecasting ability on both the GSECI and GSEFSI. Regulators and policymakers should enhance CAR, CLATA, and CD to positively impact stock returns and also address the negative effect of CLASL through improved lending practices and risk management. Additionally, policies should be implemented to control inflation and boost economic activity to mitigate their negative impact on stock returns. Finally, regulators and policymakers should develop dynamic strategies by continuously monitoring financial indicators to adjust to changing economic conditions and improve market confidence.

KEYWORDS

Conditional Causality in Quantiles

Financial Soundness

Ghana Stock Exchange

Quantile Regression

Stock Returns

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DEDICATION

To my Family

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LIST OF ACRONYMS

APT	Arbitrage Pricing Theory
BoGCIEA	Bank of Ghana Composite Index of Economic Activity
BSFSIs	Banking Sector Financial Soundness Indicators
CAR	Capital Adequacy Ratio
CD	Credit to Deposits
CLASL	Core Liquid Asset to Short-term Liabilities
CLATA	Core Liquid Asset to Total Asset
FSAP	Financial Sector Assessment Program
FSI"s	Financial Soundness Indicators
GFC	Global Financial Crisis
GSECI	Ghana Stock Exchange Composite Index
GSEFSI	Ghana Stock Exchange Financial Stock Index
IMF	International Monetary Fund
NPL	Non-Performing Loans
ROA	Return on Assets
ROE	Return on Equity

CHAPTER ONE

INTRODUCTION

Financial institutions and financial markets are the two major components of every financial sector. The financial soundness of the banking sector and stock returns, which are the important economic indicators of Ghana provide valuable insight into the overall health and stability of the Ghanaian economy. Besides, they reflect the performance of the stock market and investor sentiments toward the economy. A country's financial market and real market are driven by the banking industry (Ahmet, 2022). The association between the banking sector's financial soundness and stock returns is crucial due to the significant impact it has on the overall stability of the financial system and the broader economy yet, under-studied in the Ghanaian context.

As such, the study aims to investigate the effect of the banking sector's financial soundness on stock returns in Ghana. Thereby contributing to existing literature and providing valuable insights for investors, policymakers, and regulators in Ghana.

Background to the Study

Economic growth and finance theories like the financial intermediary theory (Tobin, 1963), capital market theory (Rubinstein, 2002), and Schumpeterian growth theory (Schumpeter, 1934) assert that both banking sector and stock market developments are vital in fostering economic expansion. Empirical studies by Levine(2005) and (Demirguc-Kunt & Levine, 1996) also support the perspective of the financial sector promoting economic advancements at the business, industry, and national levels. By intermediating, deploying funds as a credit to other sectors of the economy, and fostering

innovation, the banking industry promotes economic growth and poverty reduction. However, financial markets play a significant role in enabling opportunities and giving information about investment options for individuals and organizations to participate (Asravor & Fonu, 2021). The returns earned from the stock market through investment reveal a positive correlation with economic advancement (Cole et al., 2008).

The financial soundness of the banking sector as well as stock returns has an integral role to play in Ghana's effort to demonstrate its commitment to Global goals. The interplay between the financial soundness of the banking sector and stock returns can assist Ghana in achieving the following Sustainable Development Goals (SDGs). The banking sector's financial soundness and stock returns are required to attract foreign investment to help fund sustainable development goals such as green projects (Climate Action; SDG 13). It will also help to provide long-term financing as support (Industry, innovation, and infrastructure; SDG 9) and credit to small and medium-sized businesses, which will, in turn, create jobs (Decent work and economic growth; SDG 8) and raise income (Reduce inequalities; SDG 10) to support poverty reduction (No poverty; SDG 1).

Additionally, the banking sector's financial soundness is essential to stock returns on account of the influence it has on investor confidence, cost of capital, Systematic risk, economic indicators, and both direct and indirect exposure to bank performance. Nonetheless, stable stock returns reduce the perceived risk of an investment (Fama & French, 2004), contribute to market stability which is essential for the efficient functioning of the economy (Fama, 1970; Schwert, 1992), aid a better performance measurement and

benchmarking by investors and also help portfolio managers to construct diversified portfolios that meet their risk-return objective (Markowitz, 1952).

Ghana's financial sector, like that of most developing countries, has undergone changes to progress from a restrained to a developmental one over the last three decades. This is due to the financial sector's critical role in enhancing economic progress and development. Consequently, sector amends were regarded as a major step to unleash dynamism and elevate the country's standing to a robust emerging economy. Although Ghana's financial system includes a diverse spectrum of entities, the banking sector dominates.

After bringing down the total number of banks to 23, the banking industry's financial performance improved significantly in 2019, exactly a year after the sector's recapitalization and reforms were completed. Thus resulting in increased balance sheet size indicators and bank profitability, as well as improvement in key financial soundness indicators (Bank of Ghana, 2020). Financial Soundness Indicators (FSIs) of the sector also showed a significant improvement, highlighting a banking sector that is more solid and strong when compared to previous years and even amid the COVID-19 pandemic. Until now, the sector has remained strong and resilient (Bank of Ghana, 2020).

The financial soundness of the banking sector refers to the capacity of banks to withstand financial shocks and maintain stable operations in the face of economic turmoil (Asian Development Bank, 2015; International Monetary Fund, 2006). The soundness of financial institutions is a pivotal component in achieving financial stability.

By measuring and monitoring the soundness of the banking sector, potential systemic risks can be identified and detected early on. This proactive

approach helps prevent these risks from materializing and avoids the occurrence of financial predicaments (Bitetto et al., 2023). The financial soundness of the banking sector is known to be measured using a range of indicators such as liquidity, capital adequacy, asset quality, earnings, and sensitivity to market risk (Bank of Ghana, 2020).

Creating and analyzing FSIs assists in macro-prudential analysis and also helps policymakers to better understand the strengths and vulnerabilities of a country's financial systems. It also enables them to take proactive steps to prevent crises or at least lessen the effects of crises (Asian Development Bank, 2015). Researchers have suggested several approaches to evaluating financial soundness. According to Bitetto et al. (2023), the financial indicators method is one of several essential approaches to evaluating financial soundness. The financial indicator approach collects quantitative and qualitative data from financial firms' balance sheets and other relevant financial records (World Bank, 2016).

The FSIs have gone a long way since their inception in the early 2000s. However, it is necessary to look beyond lessons to determine whether FSIs in their current form will continue to be effective in performing their goal in light of the rapid structural changes occurring in financial systems (Fernando, 2017). As such, FSIs are essentially utilised to evaluate the condition of financial systems at the micro level. Yet, these indicators can reveal possible flaws in national and global financial systems when aggregated. Implementing rules that address vulnerabilities at both the micro and macro levels requires leveraging the knowledge of financial soundness.

In addition to serving as significant references in financial stability reports at the national, regional, and global levels, FSIs are frequently used to create benchmarks for risk assessment at the national level (Fernando, 2017). Capital Adequacy Ratio (CAR), Core Liquid Assets to short-term liabilities (CLASL), Core Liquid Assets to Total Assets (CLATA), Credit to Deposits (CD), Non-Performing Loans (NPL), Return on Assets (ROA), and Return on Equity (ROE) are among Ghana's banking Sector FSIs.

These FSIs for Ghana came about because of the IMF's and the World Bank's Financial Assessment Sector Program (FSAP) for the country. During the development of the FSIs for Ghana, the IMF and Bank of Ghana collaborated to identify key indicators that would provide a complete overview of the health and stability of Ghana's financial system. The indicators were chosen per their relevance, availability, and dependability to Ghana's financial sector, and comparability to other countries (World Bank, 2017). According to the Ghana Investment Promotion Centre (2021), banks dominate Ghana's financial system and the soundness of banks in Ghana is required for macroeconomic and financial stability (Akosah et al., 2018). As a result, a concern for financial soundness emphasizes the banking sector's financial soundness.

Figure 1 shows fluctuations in the trends of the banking sector's financial soundness with a downward trend in CAR from 2011 to 2013 followed by a slight increase in 2014 and another decline in 2017 and 2018, and a steady increase from 2019 to 2021 until the end of 2022 when there was a decline. The CLASL is observed to be generally increasing from 2011 to 2016 indicating an improvement in managing liquidity risk within the banking

sector during the period. However, a decline sets in from 2017 to 2018. In 2019, it improved again but declined slightly from 2020 through 2022.

Furthermore, the CLATA showed a generally increasing trend with some fluctuations. There was an increment from 2011 to 2012 with a slight decline in 2013 and another increment from 2014 through to 2016 and declined slightly again in 2017 but picked up again in 2018 through to 2020 and declined in 2021 due to the pandemic. The CD from 2011 continually increased through to 2016 followed by a decline in 2018 attributed to tighter lending regulations by the Bank of Ghana, which increased in 2019 but decreased again in 2020 through to 2022. In addition, NPL reduced from 2011 to 2014. It rose again in 2015 and 2016 due to bad debt followed by a continuous decrease from 2017 to 2019. However, the impact of COVID-19 caused an increase in 2020 and 2021 and a decrease in 2022.

The ROA was very volatile from 2011 to 2012 and was at its highest level in 2013. The ROA dropped significantly with a continuous decline until 2020. The ROA started to recover in 2021 through to 2022 but was still lower than the levels in 2011 and 2012 and finally, the ROE continued to rise from 2011 to 2015 but started declining from 2016 through to 2019. However, there was a slight improvement in 2020 and an increase in 2021 through 2022. Overall, the fluctuation in the banking sector's financial soundness is linked to Ghana's banking crisis in 2017, the outcome of the COVID-19 pandemic, and Ghana's financial crisis in 2022 resulting from the Russia-Ukraine war.

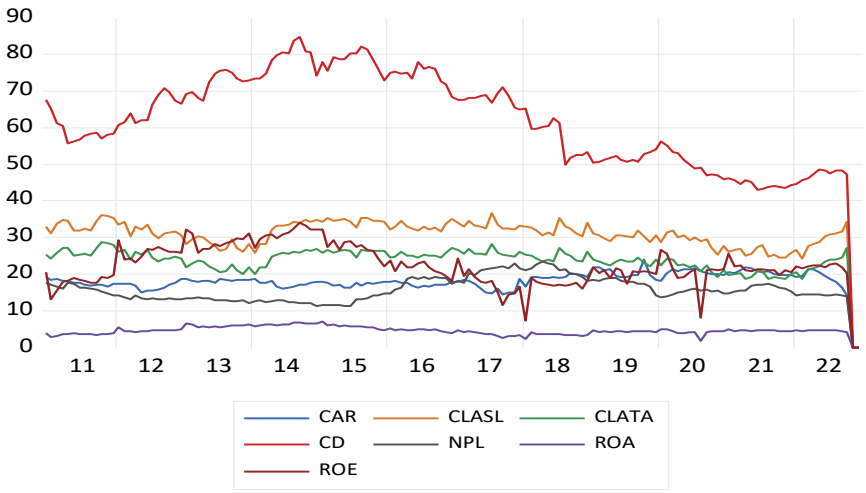


Figure 1: A graph representing the Banking Sector Financial Soundness Indicators (BSFSIs) of Ghana between the period 2011 and 2022.
Source: Author's Computation (2023)

The Ghana Stock Exchange (GSE) was founded in July 1989 and began trading in November 1990, serving as Ghana's primary stock exchange. It is a platform for the electronic trading of securities in Ghana. Presently, GSE uses the GSE Automated Trading System (GATS) as a replacement for its manual trading system. GSE issues two market indices: the GSE Composite Index (GSECI) and the GSE Financial Stocks Index (GSEFSI), which have been volatile in response to economic conditions and other factors, including the recent COVID-19 Pandemic (Idun et al., 2022).

The GSECI is the primary index for the GSE. It reflects the performance of the whole market (Numapau Gyamfi, 2018) and is a yardstick that gauges the performance of listed companies (Ofori-Boateng et al., 2022). This index is a market value-weighted of all publicly traded companies on the stock exchange. The GSEFSI is a subset of the GSECI (Owusu Junior et al., 2018) but includes stocks from the financial sector, particularly those from the banking and insurance sectors, and its components. Currently, the GSE has 37 Listings. The study seeks to employ both the GSECI and GSEFSI as a

representation of stock returns from January 2011 to December 2022. The study used the GSE because it is among the prominent emerging stock exchanges in Africa and plays a critical role in the Ghanaian economy.

Figure 2 shows that the GSECI experienced fluctuations from 2011 to 2022. The index suffered significant declines during periods, particularly in 2013, 2015, 2016, 2020, and 2022. Overall, the GSECI experienced a downward trend from 2011 to 2015. The index then experienced a gradual recovery from 2016 to 2018 reaching a high point in 2018. However, the index experienced a significant decline in 2020 because of the adverse repercussions of the COVID-19 pandemic on the worldwide economy and financial markets, a trend up in 2021 and finally a decline in 2022. The GSEFSI behaved similarly to the GSECI over the period but experienced a more pronounced decline in 2016. Overall, the trend of the indices suggests instability in the Ghana stock exchange. This instability is attributable to ongoing country-specific factors, notable external economic situations and reforms as well as the contemporary COVID-19 Pandemic.

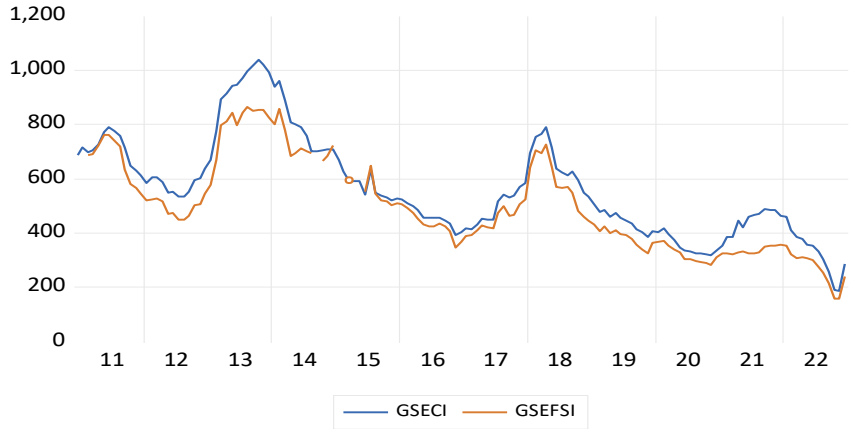


Figure 2: A graph representing the GSE Indices between the periods of 2011 to 2022.
Source: Author's Computation (2023)

The relevant theory of the study is deeply rooted in the Arbitrage pricing theory (APT). The APT was propounded by Ross (1976) and holds through various channels of effects including industry-specific, and company-specific factors, global events, and macroeconomic determinants (Siregar, 2019). This theory proposes a framework for understanding the associations between the financial soundness of the banking sector and stock returns in Ghana. This theory will also serve as a guide to analyzing and determining how the study's objectives hold up in practice.

Statement of the Problem

Banks are among the important institutions that ensure the functioning of financial markets. The emergence of the financial crisis in the past years, and the movement of international capital flows increasingly stirred up interest in the banking sector's financial soundness (Davies, 2011). This owes to the potential effect of the financial crisis spreading across other countries' financial sectors. According to the World Bank Group (2013), West African countries including Ghana are exposed to the absence of long-term investment capital, which is attributable to the underdevelopment of their financial sector. Accordingly, Asravor and Fonu (2021) contend that although Ghana's financial sector is dominated by banks, they are unable to supply long-term capital but can provide short–term capital. As a result, the inability of banks to provide long-term capital poses a significant threat to the financial soundness of the banking sector, stock market, and the economy.

Furthermore, Brafu-Insaidoo and Ewusie (2023) assert that available statistics from the economic data of the Bank of Ghana indicate the financial sector instability of Ghana over a decade. Current statistics by the Bank of

Ghana (2023) recorded the GSECI fell from 2,789.34 in 2021 to 2,443.91 in 2022. Thus, a loss of 12.4 percent by the end of 2022, compared to a gain of 43.7 percent at the end of 2021. As a result, the GSEFSI fell to 2,052 by the end of 2022, representing a 4.6 percent drop compared to a 20.7 percent growth at the end of 2021. The volatility makes the market less stable (World Bank, 2016; Brafu-Insaidoo & Ewusie, 2023). Accordingly, shocks on stock returns may differ across their quantile distributions leading to asymmetric susceptibility of stock returns to macroeconomic fundamentals (Assifuah-Nunoo et al., 2022; Nusair & Al-Khasawneh, 2018). Furthermore, due to the spillover effects of unfavorable macroeconomic trends, the banking sector's performance in 2022 was inconsistent, starting positively and ending with losses in key financial soundness indicators.

Statistics from the Bank of Ghana monetary policy report for 2023 indicated a reduction in the CAR, ROE, and ROA of the banking sector from 19.6%, 20.6%, and 4.5% by the end of 2021 to 16.6%, 14.6%, and 3.1% respectively by the end of 2022. The reduction in the broad liquidity measures of the entire banking sector indicated a considerable reduction in investments over the year 2022. The statistics of losses and extreme inconsistencies in the banking sector and from the Ghana stock exchange above raise an alarm in Ghana's quest for financial services development and indicate an increased uncertainty in the country's investment outlook.

Additionally, the losses and the inconsistencies in the banking sector's financial soundness indicators tend to generate a heightened risk and unfavorable implications on the overall economy. The dynamics above highlight the need to examine Ghana's banking sector's financial soundness

and it stock returns. This will consequently help enable a haven atmosphere in attracting both local and foreign direct investments geared towards economic growth and the mitigation of financial risks.

Empirically, researchers in various emerging economies have studied the link between financial soundness indicators and stock prices, stock returns, and financial stability (Aayale et al., 2022a; Almahadin et al., 2020; Yaser et al., 2022). Similarly, in Ghana, studies that come close to this study were conducted by Idun et al., (2022) on the interrelationship between indicators of the GSE and macroeconomic indicators, and Kyei et al (2023) on the relationship between commodities and the banking sector financial soundness.in Ghana. As a result, the above dynamics from the emerging economies and the Ghanaian setting signal the limited studies in assessing how the financial soundness of the banking sector influences stock returns, yet, the (Bank of Ghana, 2023) highlights the essence of fostering financial soundness and the contribution of the financial sector to economic advancements.

In addition to the gap of limited studies in Ghana, both studies employed the wavelet approach in their analysis. The association between the financial soundness of the banking sector and stock returns may be multifaceted as well as interconnected. As a result, this study differs from earlier studies in two ways. To begin, the study models the relationship to gain a deeper understanding by utilising quantile regression. Finally, the study determines the causality using conditional causality in quantile. Quantile regression helps to identify specific levels of financial soundness that are associated with different levels of stock returns.

The use of quantile regression will allow deriving conclusions about the relationship between the two variables across changing economic conditions, in contrast to alternative techniques that only give the average relationship between the variables (Nusair & Al-Khasawneh, 2018). This is especially useful for making distinctions between market circumstances (Assifuah-Nunoo et al., 2022). Quantile regression is robust to outliers, skewness, and, non-normality as observed with financial data series.

Moreover, conditional causality in quantiles will assist in determining if the banking sector's financial soundness has predictive abilities on stock returns across different quantiles. Thus following the studies of (Alsubaie et al., 2022; Archer et al., 2022; Asafo-Adjei et al., 2022; Assifuah-Nunoo et al., 2022; Bossman et al., 2022; Kyei, Cantah, et al., 2023). Conditional causality has the uniqueness of detecting the underlying dependence structure between the analyzed time series, making it robust against model errors and non-linear dynamics in data. It also allows for testing causality beyond the mean as well as in fat tails and variance (Balcilar et al., 2017).

Overall, quantile regression and conditional causality in quantile are utilised to supplement the wavelet approach's results as each approach conveys unique insights into the dynamics and interactions between the variables. This combination allows for the inclusion of the impact of banking sector financial soundness on stock returns, just as the wavelet approach captured the comovement between the banking sector financial soundness and stock returns. Because the banking sector's financial soundness indicators provide a comprehensive picture of Ghana's financial sector, taking into account the effects will provide actionable insights to investors, policymakers,

and other stakeholders in understanding the dynamics of Ghana's financial system and making informed decisions, risk management strategies, and policy interventions aimed at economic growth and preventing potential risks from materializing. The study examines the effect of the banking sector's financial soundness on stock returns in Ghana as well as the conditional causality between them.

Purpose of the Study

The study seeks to examine the impact of the banking sector's financial soundness on stock returns in Ghana.

Research Objectives

The following objectives guide the study;

1. To examine the relationship between the financial soundness of the banking sector and stock returns.
2. To assess the conditional causality between the financial soundness of the banking sector and stock returns.

Research Questions

The study is directed by the research questions;

1. What is the relationship between the financial soundness of the banking sector and stock returns?
2. What is the conditional causality between the financial soundness of the banking sector and stock returns?

Significance of the Study

To begin, the study's findings will provide valuable insights to regulators, policymakers, and investors on the performance of the Ghanaian

banking sector and the stock market in designing effective policies and strategies for promoting financial stability and economic growth.

Secondly, the findings will also be useful to investors, policymakers, and other stakeholders in understanding the dynamics of the Ghanaian financial system and making informed decisions, risk management strategies, and policy interventions aimed toward economic growth.

Finally, the significance of the study also lies in its contribution to the existing body of literature on banking sector financial soundness and stock markets in emerging markets, particularly, in the context of Ghana.

Delimitation

The study focused on the banking sector and the stock returns of Ghana. The study's variables were independent, dependent, and control variables. The independent variable was the banking sector's financial soundness measured by NPL, ROE, ROA, CAR, CD, CLASL, and CLATA. The dependent variable was the stock returns proxy by GSECI and the GSEFSI. The control variable consisted of macroeconomic variables such as the inflation rate and the Bank of Ghana Composite Index of Economic Activity (BoGCIEA) as a metric of Gross Domestic Product (GDP).

Based on consistent data availability, the period for the study was from 2011 to 2023. The Bank of Ghana database and Equity RT are the sources of the study's data. The study's control variables were recognized to have a predictive impact on stock returns in Ghana. The study employed quantile regression as the main estimation technique and is supported by conditional causality in quantile.

Limitations of the Study

The study assessed the overall financial soundness of the banking sector and not the individual banking institutions listed on the GSE. The study is focused on Ghana. Therefore, the findings of the study are limited to the Ghanaian context and may not apply to other countries. Besides, the study is silent on the time and frequency associations among the variables and is limited to assessing the effect of financial soundness on the quantile distribution of stock returns.

Organisation of the Study

The study's organization is in five chapters. Chapter One covered the introduction, background, statement of the problem, objectives, research questions, significance, delimitation, and limitations of the study. Chapter Two presents a review of the literature including theories underpinning the study, conceptual review, and empirical review. Chapter Three emphasizes the research methods consisting of research design, research approach, sources of data, analytical techniques, and model estimation and analysis. Chapter Four emphasizes the results and discussion and Chapter Five covers the summary, conclusions, and recommendations derived from the study.

CHAPTER TWO

LITERATURE REVIEW

Introduction

By the study's objectives, this chapter provided an overview of the key theory, concepts, and existing research related to the banking sector's financial soundness and stock returns in Ghana. The review began by examining the key theory (Arbitrage Pricing Theory) and concepts (banking sector financial soundness as well as stock returns) related to the study. The study further reviewed related empirical literature by other researchers on that which is of relevance to the study.

Theoretical Review

There is a main theoretical explanation for the relationship between the banking sector's financial soundness and stock returns in the existing literature on financial economics. This is the Arbitrage Pricing Theory (APT).

Arbitrage pricing theory (APT)

APT was propounded by Ross (1976). It is a financial framework designed to expound the correlation between an asset's expected returns and its exposure to various risk factors that represent systematic risk (Daariy et al., 2023; Ouma et al., 2014; Ross, 2013; Siregar, 2019).

Empirically, John (2019) opined that according to APT asset returns are affected by determinants such as exchange rate, interest rate, dividend yield inflation rate, consumer price index, gross domestic product, unemployment rate, industrial output index, exchange rate, interest rate, and other economic factors. As a result, APT is based on the notion that multiple risk factors influence stock returns.

Chen et al. (1986) employed macroeconomic data between January 1952 and November 1984 from the United States (US) to test the applicability of APT in the US security market. The researchers discovered several economic factors to be essential in explaining expected returns over the period of study. The study concluded that stock returns are influenced by systematic economic news that is factored into market pricing ad that the APT provides a framework for understanding these factors and their effects on the market.

In the context of this present study, the financial soundness of the banking sector is identified as a critical component of systematic risk. Because their stability impacts the overall economy and influences other industries and sectors as well as the entire volatility and performance of the stock market. Thus, APT provides a framework for understanding and measuring the relationship between the financial soundness of the banking sector and stock returns. The APT best establishes the relationship between the financial soundness of the banking sector and stock returns as objective one, and the conditional causality between the financial soundness of the banking sector and stock returns as objective two, based on the discussion above.

Conceptual Review

This section provides a review of the banking sector's financial soundness and stock returns. It explains the meaning of the terms and the rationales behind their use in this study.

Banking sector's financial soundness

FSIs emerged in response to the global financial crisis in the late 1990s such as the Asian and the Russian financial crisis (International Monetary Fund, 2006). Since then, the IMF has revised the FSIs to account for

modifications to the world financial system. For policymakers to evaluate the soundness and stability of financial systems, the IMF recognized the need for a standardized and comprehensive set of indicators. The goal of FSIs was to assist in identifying potential flaws in the financial system and in taking the necessary steps to avoid or lessen crises (Asian Development Bank, 2015).

These indicators are comparable across countries and intended to provide early warning indicators of potential financial sector problems. According to IMF (2006), Financial soundness indicators are classified into core or primary and encouraged or recommended sets. The core indicators evaluate deposit-taking institutions' susceptibility to potential risks, such as asset quality, capital adequacy, earnings and profitability, market risk exposure, and liquidity. In addition, encouraged indicators are gathered on a per-country basis to evaluate the stability of alternative financial sectors, including non-bank financial institutions, borrowers (both households and non-financial businesses), and related markets such as real estate and securities markets.

According to an IMF working paper, FSI uses a methodology that is universally accepted, and due to the alliance these indicators effectively evaluate the internal and external risk exposures of a financial sector (Pietrzak, 2021). Interest in the soundness of the banking sector significantly increased with the start of the Global Financial Crisis (GFC) in the summer of 2007 (Davies, 2011) and the corresponding regulatory reforms (Fernando, 2017). Because of the developments in the GFC, there has been an increased focus on the state of countries' banking systems. The soundness of the banking system is important because it provides insight into the likelihood that financial issues

will be spread to the real economy Asian Development Bank (2015); Davies (2011). For instance, there will be a decline in loan supply and signals in stock price indices.

IMF instigated the gathering and evaluation of financial soundness indicators with the collaborative endeavours of the IMF and World Bank through the FSAP. The design primarily aimed to detect vulnerabilities in financial systems. IMF in a joint effort with the financial standard-setting bodies, and other international and regional organizations, published a compilation guide on FSIs. It was centered on accumulated bank balance sheets and information from income statements, as well as accumulated indicators from the financial statements of the nonbank financial sector (International Monetary Fund, 2006).

Banking sector financial soundness described by Salina et al. (2020) refers to the situation in which the financial indicators that reflect a bank's capital adequacy, asset quality, liquidity, and efficiency fall within a specific domain to ensure that a bank gains the ability to endure unfavorable market conditions. The financial soundness of the banking sector mirrors the economic, social political, and financial conditions prevailing in each country. According to Abbas and Hassan (2022); Ahmet (2022), the banking sector's financial soundness is the ability to maintain a firm and healthy financial system, facilitate the efficient allocation of resources for production, effectively manage potential risks, and improve the effectiveness of monetary policies. According to Almahadin and Tuna (2017), a sound banking sector is crucial for a country's financial system's overall well-being. This means that a country's banking sector must be financially strong and capable of overcoming

economic challenges to ensure the financial system's overall stability. Thus, this study adopts the concepts of these definitions.

The banking sector's financial soundness is pivotal due to the impact of several elements such as international movements of capital, economic conditions in both local and worldwide markets, technological improvements, changes in the trade sector, and economic entities' future expectancies. These elements have the potential to produce financial vulnerabilities in the banking sector, emphasizing the importance of having a robust and safe banking system to promote and support its soundness (Ahmet, 2022). Since financial soundness has various dimensions, diverse characteristics, and complicated interrelationships among its components, relying on a single quantitative indicator to effectively quantify its presence and availability levels is unrealistic. This intricacy also makes predicting financial crises and the dissemination of their impacts more challenging. Consequently, there is an urgent need to use a comprehensive systemic approach to examine the overall health of the financial system. Pertinent to that, the IMF has created a series of metrics to represent the general soundness of the financial sector, detect weaknesses besides predict and resolve prospective difficulties (Abbas & Hassan, 2022).

Capital Adequacy Ratio (CAR), Core Liquid Assets to short-term liabilities (CLASL), Core Liquid Assets to Total Assets (CLATA), Credit to Deposits (CD), Non-Performing Loans (NPL), Return on Assets (ROA) and Return on Equity (ROE) are the FSIs of the banking sector displayed in the database of Bank of Ghana. These banking sector FSIs for Ghana came about following the World Bank and IMF's FSAP for the country. During the

development of the FSIs for Ghana, the IMF and Bank of Ghana collaborated to identify key indicators that would provide a comprehensive picture of the health and stability of Ghana's financial system. The indicators were chosen per their relevance, availability, and dependability to Ghana's financial sector, and comparability to other countries (World Bank, 2017).

Capital adequacy

Capital adequacy is among the significant measures for the financial soundness of the banking sector (Ahmed & Dogarawa, 2021a)**.** Capital adequacy ensures that banks have sufficient equity funding that corresponds to the type and magnitude of risks related to their operations. It also aids the capability of management to detect, evaluate, reduce, and manage these risks in a prompt and effective way (Salina et al., 2021). According to Abbas and Hassan (2022), capital adequacy is an indicator of the banking sector's financial strength. In the evaluation of capital adequacy, the metric utilised is the Capital Adequacy Ratio (CAR) (Fadoua & Brahim, 2020; Salina et al., 2021).

Capital Adequacy Ratio (CAR) assesses a bank's soundness based on its capital (Hajar & Tho'in, 2020a). The ratio analyzes the connection between a bank's capital and the degree of risk associated with its assets. This ratio encourages banks to maintain a strong capital foundation, which can improve their financial resilience and ability to resist economic and financial shocks like the 2008 global recession. Banks with higher levels of capitalization can better deal with moments of financial turbulence in the economy. A higher CAR indicates that a bank has a strong financial position and can absorb unexpected losses without risking insolvency. Conversely, a lower CAR

indicates that a bank is more susceptible to financial distress and may have difficulty meeting its obligations. Thus, the study uses CAR as a proxy for capital adequacy in measuring banking sector financial soundness.

Asset quality

Asset quality pertains to the magnitude associated with current and prospective credit risk contained in various credit loans, investment portfolios, fixed assets, and off-balance-sheet transactions (Ahmed & Dogarawa, 2021a; Salina et al., 2021). Jnr et al.(2014) assert that asset quality is the efficiency of a bank's credit screening and risk monitoring as well as the ability to ensure that both loans and principal are successfully collected. According to Abbas & Hassan (2022), asset quality refers to the bank's level of risk exposure concerning issued loans. A bank with high-quality assets is considered more sound and resilient in times of economic stress and market downturns. In contrast, a bank with poor asset quality is vulnerable to default risk and could experience significant losses during economic turbulence (Fadoua & Brahim, 2020). The measure of asset quality is frequently looked at in the dimension of Non-Performing Loans (NPL) (Albulescu, 2015; Salina et al., 2021).

Non-performing loan (NPL) is a standard asset quality metric for banks, which indicates the overall health of a bank's loan portfolio (Davies, 2011). It denotes the percentage of loans in a bank's portfolio that are not producing income because they are in default or are unlikely to be repaid. This ratio is an essential indication of a bank's financial health since it indicates the loan quality and the effectiveness of the bank's risk management practices. A high NPL indicates the bank's vulnerability to increased credit risk and may struggle to generate profits from its loan portfolio. A high NPL may also

signal that a bank should make extra provisions for bad loans which can harm its profitability, liquidity, and capital position (Wapmuk, 2017).

There are two approaches to determining asset quality. The first directly measures the proportion of a financial institution's assets that are in default or on the verge of default, known as non-performing loans. The second is the sectoral distribution of loans to total loans, which demonstrates how diverse the assets are and highlights any regions of high-risk concentration (Asian Development Bank, 2015). Consequently, this study adopts Non-Performing Loans (NPL) classified under asset quality as a proxy to evaluate the financial soundness of the banking sector.

Liquidity

According to Ahmed and Dogarawa (2021a), liquidity refers to the circumstance where a financial institution can easily access sufficient funds to satisfy its obligations promptly and efficiently without incurring excessive costs. This is an important aspect in ensuring a bank's financial soundness since it displays the institution's ability to meet financial obligations as they emerge (Aayale et al., 2022b; Yaser et al., 2022). Banks hinge on a continuous stream of funds to function effectively. Thus, their inability to meet obligations could have major consequences for the bank as well as its various stakeholders.

The banking sector must retain enough liquidity to meet both its clients' needs and cash obligations (Salina et al., 2021). Banks hold an amount of cash and or liquid assets that can be easily turned into cash to ensure sufficient liquidity. Regulators establish liquidity requirements to ensure that banks have sufficient liquidity to provide a cushion against unforeseen

circumstances and a buffer during disruptions in financial markets. This requirement typically specifies the minimum amount of liquid assets that a bank must hold relative to its liabilities and the duration to meet this requirement.

The core set of FSIs includes two measures of liquidity. These are the liquid asset to total asset and the liquid asset to short-term liabilities ratio. The former demonstrates the ability of banks to handle unexpected financial demands, and the latter measures the liquidity gap between assets and liabilities as well as assessing the liquid assets' capacity to meet short-term fund withdrawals (Asian Development Bank, 2015; Davies, 2011; Jnr et al., 2014). Maintaining an appropriate amount of liquidity while doing away with excessive liquidity is indispensable, as excess liquidity can cause the currency to depreciate and lead to inflation (Asian Development Bank, 2015).

An additional liquidity indicator used in the banking sector is the credit to deposits (CD) ratio. It assesses the potential of a bank to meet its financial obligations towards depositors. According to Abbas & Hassan (2022), the CD ratio is a frequently used metric in the banking sector to assess liquidity risk and promote financial stability and soundness. It is a significant measure of the proportion of a bank’s loan with its deposit and is regularly monitored by regulators and financial institutions to manage risk and ensure the financial system's integrity. The ratio compares banks' outstanding loans to their total deposits.

A very high CD ratio implies that a bank’s lending exceeds what it has in deposits. This can be challenging, as such banks may not have enough funds to fulfill their financial obligations in a situation of a bank run

(Agyemang et al., 2020). An extremely low CD ratio, on the other hand, may signal that the bank is not fully utilising its lending capacity and thus missing possible revenues (Qamruzzaman, 2014). Accordingly, this study adopts `CLATA, CLASL, and CD as measurements of the banking sector's financial soundness

Earnings/Profitability

According to Abbas and Hassan (2022), Profitability refers to a bank's financial strength and ability to avoid losses while maintaining the value of shareholders' investments. It is a metric used to determine how efficiently a corporation can generate profits from its normal business operations. Salina et al (2020) assert that Profitability shows management's ability to generate revenue while minimizing expenses such as exceptional expenses, bad debts, and legal fees. Ahmed and Dogarawa (2021b) noted that the main way for a bank to increase its capital is through earnings, which refers to the profit generated from its business operations. This profit acts as a protective measure against the risks associated with engaging in business and helps prevent capital decline caused by asset value diminution.

A bank's ability to generate vigorous earnings and maintain profitability indicates its capacity to support its current and future operations. Furthermore, increased earnings lead to sufficient capital, which can absorb any losses and provide ample dividends to shareholders. Profitability is significant because of its capacity to manage potential risks that present a threat to the banking sector. Hence, the profitability of the banking sector is vital for financial stability (Fadoua & Brahim, 2020). Return on Assets (ROA) and Return on Equity (ROE) are two key measures used in determining

profitability. ROA and ROE serve as proxies for how effectively deposit takers use their capital and assets to produce income (Asian Development Bank, 2015).

According to Qamruzzaman (2014), ROA gauges the efficiency with which a company's assets produce revenue. The ROA reveals how effectively management uses its resources to give rise to profit. According to Albulescu (2015), ROA is a financial metric that determines the profitability of the banking sector. Jnr et al.(2014) assert that ROA measures the profits earned by a bank's assets. This metric is useful for determining how effectively a bank utilises its assets to attain profitability.

According to Qamruzzaman (2014), ROE measures a company's profitability by calculating the amount of profit generated from shared stockholder investments. According to Albulescu (2015), ROE is a financial indicator that measures a banking sector's profitability by calculating how much profit was made per unit of shareholder investment. The ROE allows investors and analysts to assess how well a bank uses shareholder capital to produce profits. Jnr et al. (2014) also assert that ROE depicts the profit a bank makes to the total amount of shareholder equity. This metric indicates how effectively the bank utilises shareholders' funds to yield profits. A higher ROE typically implies better performance since it reflects the returns and potential growth of the investors' investments (Agyemang et al., 2020). Banks with a high ROE are also more apt to generate cash internally. Accordingly, this study makes use of the ROA and ROE as a measure of the banking sector's financial soundness.

Stock returns

The basic goal of establishing a stock exchange is to simplify the process of saving and borrowing by pooling money from multiple sources and providing a platform for converting them into profitable investments. The stock market is critical in redistributing funds throughout various sectors of the economy. It acts as a platform on which numerous elements collaborate to enhance a country's economic progress (Ahmad & Ramzan, 2016). The stock market holds considerable importance in the general well-being of a country and mirrors the performance of its diverse segments. Its significance extends to the global economy, leading to dedicated efforts to ensure its growth and development (Bhowmik & Wang, 2020).

Sock returns defined by Alpiani et al. (2022) are the gains or losses made by investors over a set period, indicating the rate of return on their assets. Stock returns consist of a variety of components, including dividends paid to investors in cash, shares, and property, as well as capital gains. These components indicate investors' profits or losses on stock investments. According to Nyaga (2014), the difference between a stock's current price and the price at which it was originally purchased by the investor is referred to as a stock return. It may be expressed as a percentage or in absolute terms of total investments. This study employs the same definitions and measurement methods as indicated.

The GSE is among the major emerging stock exchanges in West Africa and plays a critical role in the Ghanaian economy. GSE issues two market indices: the GSECI and the GSEFSI, which have been volatile in response to economic conditions and other factors, including the recent COVID-19

Pandemic Idun et al. (2022). Stock price and index changes provide insight into the likely future direction of particular stocks, industries, or the economy as a whole. Given the importance of the financial sector to the overall health of the economy, keeping an eye on these trends is critical Nyaga (2014). Investors use the stock price index to evaluate the performance and return of stock as well as to forecast potential market trends (Sampene et al., 2021).

They interpret rising stock prices as positive news or indications for the stock while falling prices indicate problems with the stock's performance. A stock's performance can be affected by a variety of factors, including economic, political, international, and company-specific issues (Awadzie & Garr, 2020).

The GSECI is the primary index for the GSE. It reflects the performance of the whole market (Numapau Gyamfi, 2018) and is a yardstick that gauges the performance of listed companies (Ofori-Boateng et al., 2022). This index is a market-capitalization weighted of all listed firms on the stock exchange. The GSECI comprises diverse segments of the Ghanaian economy such as manufacturing, agriculture financials, mining and exploration, oil and gas, utilities, and many more (Idun et al., 2022).

The GSEFSI is a subset of the GSECI (Owusu Junior et al., 2018) but includes stocks from the financial sector, particularly those from the banking and insurance sectors, and its components. Currently, the GSE has 37 Listings. The study seeks to employ both the GSECI and GSEFSI as a representation of stock returns from January 2011 to December 2022.

Control variables

The study takes into account two macroeconomic variables, which tend to be influential factors in determining stock returns in Ghana (Asravor & Fonu, 2021; Sampene et al., 2021). These variables are the inflation rate and GDP represented by the Bank of Ghana Composite Index of Economic Activity (BoGCIEA).

Inflation rate

Inflation is a continuous increase in the general price levels of goods that over time leads to a devaluation of a country's currency (Arhenful et al., 2022; Iqmal & Putra, 2020) and is usually expressed in terms of an annual percentage rate of change (Okyere & Mensah, 2022). Arhenful et al. (2022) contend that the relationship that exists between inflation rate and stock prices is ambiguous. That is, it could vary between positive and negative contingent on the conditions. According to theories such as the generalized Fisher hypothesis, when the inflation rate is high, investors transfer from financial to real assets. As a result, because equities reflect claims on actual assets, they function as inflation hedges, suggesting that stock price has a positive link with the inflation rate.

Empirically using time series data from July 2007 to December 2019, Arhenful et al. (2022) studied the relationship between inflation and stock prices in Ghana. The findings demonstrated a positive correlation between the study's variables. Agyapong-Poku (2022) investigated how the interest rate, Treasury bill rate, and inflation rate influenced stock returns on the Ghana Stock Exchange All Share Index. Using the ordinary least-square regression analysis, the study utilised data between December 2004 and December 2015.

The study's findings showed a positive correlation between stock returns and the inflation rate.

Asravor and Fonu (2021) used the approach of ARDL cointegration to analyze the associations between macroeconomic variables and the Ghana Stock Exchange Index. The study found the logarithm of money supply, human capital, and inflation rate affects stock returns negatively while the logarithm of interest rate and foreign direct investment had a positive impact on stock returns. Asiedu et al. (2021) employed data from 2010 to 2016 to analyze the sectoral effect of interest rates and inflation rates on stock returns in Ghana. The result showed that the interest rate and inflation rate have a significant negative impact on Ghana's stock market performance. As a result, the study takes into account the monthly inflation rate of Ghana.

Bank of Ghana composite index of economic activity (BoGCIEA)

The Composite Index of Economic Activity (CIEA) represents a single value that offers perception into the existing state and projected course of an economy, providing valuable insight as to where the economy is headed (Thompson & Talafha, 2017). According to the research (Anguyo, 2011), it is a variable that is highly associated with present levels of economic activity (such as real GDP). The index forecasts the direction and flow of economic activity (Takyi et al., 2023) on a timely basis (Boateng et al., 2022).

The emergence of the CIEA came about as a reflection of cohesive measures and a broader range of economic data from real, monetary, fiscal, and external sectors to address issues provided by individual indicator analysis (Dzigbede & Pathak, 2020; Nxumalo & Bhangu, 2023; Thompson & Talafha,

2017). Consequently, the study accounts for the monthly real sector BoGCIEA.

Empirical Review

Relationship and conditional Causality between banking sector financial soundness and stock returns

The strand of literature includes findings of studies conducted in Ghana. Idun et al. (2022) examined the relationship between the Ghana Stock Exchange (GSE) indicators, the GSE Composite Index and GSE Financial Index, indicators of banking sector financial soundness, and eight interest rate measures using the wavelet approach. The study found a comovement between the indicators of the banking sector's financial soundness and the indicators of the GSE.

Additionally, Atuahene et al. (2020) employed data from the Ghana Stock Exchange between the period of 2000 and 2017. Using the Ordinary Least Squares (OLS) model, they discovered that a sound banking sector strongly affects the direction of stock market returns.

The second strand of literature comprises research undertaken in countries other than Ghana. Alpiani et al. (2022) examined how bank health affects stock returns on the Indonesia Stock Exchange. The study used panel data multiple linear regression analysis with the Common Effect Model (CEM). The findings suggested Non-Performing Loans to have a substantial negative influence on stock returns, but Return on Assets, Capital Adequacy Ratio, and Net Interest Margin had a strong positive impact. However, the Good Corporate Governance and Loan Deposit Ratio had little effect on stock returns.

During the COVID-19 pandemic, Yaser et al. (2022) looked at how financial soundness indicators affected the Amman stock exchange. According to the data used, all the financial soundness indicators had a considerable influence on market returns showing a positive correlation.

Abbas and Hassan (2022) analyzed the relationship between financial soundness indicators, represented by capital adequacy, profitability index, asset quality, sound management, interest rate risk, and bank liquidity from the Iraq stock exchange. In reaching conclusions, the researcher used the Statistical Package for Social Sciences (SPSS). The most notable of these is that the financial sector currently faces additional threats because of the fast growth of the finance industry and the global integration of financial markets, which has also highlighted the problems in maintaining the financial system's stability. As a result, policymakers have brought the issue of financial system stability onto the local and global agenda.

Aayale et al. (2022a) conducted a panel analysis using financial information from the Casablanca Stock Exchange from 2011 to 2020. The findings revealed that asset quality, liquidity, and profitability have little effect on stock prices, raising a contentious issue about the Moroccan stock market's efficacy.

Hajar and Tho'in (2020) examined how bank soundness affects stock prices. The findings unveiled that the Return on Asset and Capital Adequacy ratio had a positive and significant impact on stock prices.

Nnubia et al. (2022) looked at the link between financial soundness indicators and the performance of the Nigerian Stock Exchange (NSE). The study's findings unveiled that the liquid assets and capital adequacy ratios had

a positive association with the performance of the Nigerian Stock Exchange throughout the analyzed period, whilst non-performing loans had a negative link.

Akbar (2019) conducted a study from 2008 to 2015 to assess the effect of financial institutions' banking soundness on the stock performance of the Indonesia Stock Exchange. The study found that capital adequacy ratio and return on asset had a substantial positive impact on stock price while net interest margin had a significant negative impact on stock price with the aid of multiple linear regression analytical techniques.

Nova et al. (2024) assessed the effect of banking sector soundness on stock returns using the Indonesia stock Exchange. The results showed Nonperforming loans to have a significant positive effect on stock returns while Capital adequacy had no effect.

The variety of studies discussed above highlights the significance of BSFSIs and stock returns. The studies predominantly concentrated on individual banks in various financial sectors at the micro level. It is crucial to comprehend the relationship in aggregate or macro terms. The study addresses this gap by examining the BSFSIs in aggregate terms. When FSIs are collected aggregately, they might expose potential faults in national and global financial systems (Bitetto et al., 2023). This knowledge will help to implement policies that mitigate these vulnerabilities on both the micro and macro levels. They will also help to develop benchmarks for risk assessment at the national level, in addition to serving as major references in financial stability assessments at the national, regional, and global levels.

Furthermore, these research works did not take into consideration how changes in financial soundness affect stock returns (Fernando, 2017). To bridge this research gap, the study employed the quantile regression approach. Accounting for changes in the financial soundness of the banking sector on stock returns has benefits such as better stock price predictions, which leads to more accurate valuations. It also has the benefit of assisting investors in identifying potential risks to their investments and adjusting their portfolios accordingly. It helps provide a more transparent picture of the financial system and assists investors in gaining greater confidence in their investment decisions.

Additionally, the literature examined communicates the scant literature on the financial soundness of the banking sector and stock returns in the Ghanaian setting. Consequently, the present study seeks to fill this gap by examining the relationship between the banking sector's financial soundness and stock returns in Ghana. Because the BSFSIs provide a comprehensive picture of Ghana's financial sector. Capturing the relationship and effects will assist investors, policymakers, and other stakeholders in understanding the dynamics of Ghana's financial system. It will also assist them in making informed decisions, risk management strategies, and policy interventions aimed at financial stability and economic growth suitable for changing economic conditions.

Finally, previous studies did not apply the causality in quantile analytical technique. Thus raising a methodological gap and serving as a motivation for finding the conditional causality between the financial soundness of the banking sector and stock returns in Ghana. Conditional

causality in quantile advanced by Balcilar et al. (2017); Jeong et al. (2012) will assist in determining if the financial soundness of the banking sector has a forecasting ability on stock returns across different quantiles. Thus following the studies of (Alsubaie et al., 2022; Archer et al., 2022; Asafo-Adjei et al., 2022; Assifuah-Nunoo et al., 2022; Bossman et al., 2022; Kyei, Cantah, et al., 2023).

Conceptual Framework

This section makes a presentation of the variables, constructs, and relationships that are relevant to the banking sector's financial soundness and stock returns in Ghana. This is demonstrated in Figure 3. It shows the response of stock returns (GSECI and GSEFSI) to seven banking sector financial soundness variables.

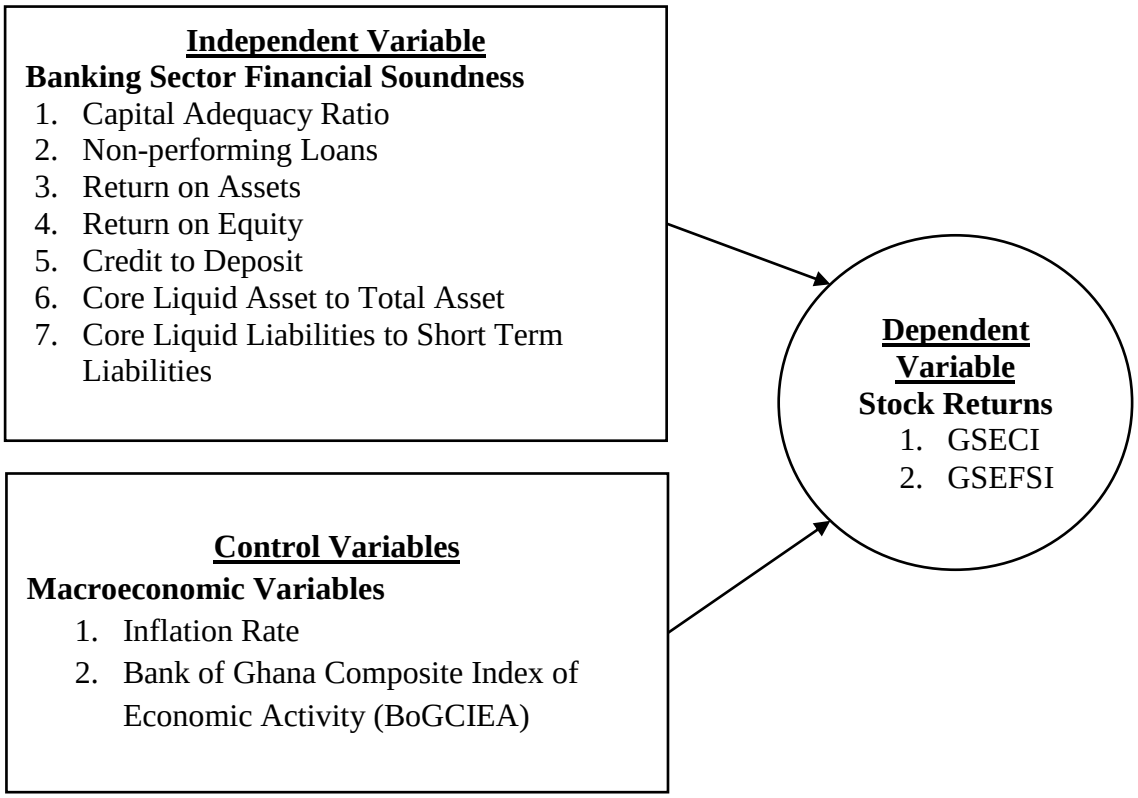


Figure 3: Conceptual framework
Source: Authors Construct (2023)

Chapter Summary

This chapter covered the theoretical, conceptual, and empirical review of the financial soundness of the banking sector as well as stock returns. The chapter was built around the study's objectives as an integral part. A wide range of literature was reviewed to get distinct perspectives conveyed by previous experts in the field of study.

CHAPTER THREE

RESEARCH METHODS

Introduction

This study's purpose was to investigate the relationship and conditional causality between the banking sector's financial soundness and stock returns in Ghana. The chapter discussed the research paradigm, approach, design, data sources, and variable definition and measurement in consistency with the study's objective.

Research Paradigm

A research paradigm is the underlying theoretical or philosophical basis for a research study (Khatri, 2020). Thus it shapes a researcher's perspective by driving the topic of study, the methods employed, and how to interpret their findings (Majeed, 2019). In the social sciences, researchers have commonly used positivism and interpretivism.

Alharahsheh and Pius (2020) advocate that if a researcher takes an extreme positivist stance, he or she will see social entities as real, observable, and quantifiable occurrences. Positivists have an ontological position to that of realism and an epistemological position of objectivism (Khatri, 2020; Kivunja & Kuyini, 2017; Rehman & Alharthi, 2016; Scotland, 2012). The data analysis process is deductive, in which the hypothesis is proposed first, and then its validity is determined based on statistical analysis results (Rehman & Alharthi, 2016). The positivist approach emphasizes the use of the quantitative approach Khaldi (2017) as the foundation for assuring the researcher's accuracy in identifying the parameters and coefficients contained in data that

is collected, analyzed, and evaluated. This helps to understand the correlations embedded in the analyzed data (Kivunja & Kuyini, 2017).

Based on the preceding points of view, this research took a positivist perspective. Thus taking an objective stance and using a quantitative approach and statistical analysis to collect and analyze data. The focus was on establishing associations between the banking sector's financial soundness and stock returns.

Research Approach

A study can employ one of the three research approaches, which are quantitative, qualitative, or a hybrid of the two known as mixed research. The quantitative research approach according to Kumatongo and Muzata (2021) is an approach that seeks to test hypotheses, establish facts, show associations between variables, and predict results. Likewise, the quantitative strategy is objective and focused on quantifying behaviours and opinions. Leavy (2022) advocates that in quantitative research, deductive procedures are used to confirm, refute, or support known theories. When the objective is to find the factors that affect or most accurately predict an outcome, or to evaluate the success of an intervention, a quantitative approach is suitable.

According to Leavy (2022), Inductive techniques for knowledge construction are often connected with qualitative research that focuses on meaning generation. Researchers employ this approach to comprehensively examine and gain an understanding of social phenomena (Kumatongo & Muzata, 2021). According to (Creswell, 2013; Khaldi, 2017; Leavy, 2022; Williams, 2007), mixed methods research entails gathering, examining, and

combining quantitative and qualitative data in a research endeavour to address research questions.

In summary, a quantitative approach was suitable for examining the associations between the study's variables. This approach enabled the collection and statistical evaluation of numerical data, which revealed the nature of the relationship between the variables. Using the quantitative approach, the study investigated the relationship between the financial soundness of the banking sector and stock returns as well as the causality between these variables. Overall, using a quantitative approach will give strong evidence to inform investment decisions and financial policymaking.

Research Design

Exploratory, descriptive, and explanatory are the three primary types of research design (Rahi, 2017). Because each design is tailored to achieve a specific goal, the classification of research designs is dependent on their intended purpose (Boru, 2018). Exploratory research design seeks to uncover new perspectives and comprehend what is happening. It is typically based on qualitative approaches, with the primary goal of gaining new insights into current events and issues (Rahi, 2017). The descriptive research design seeks information on the current state of occurrences and presents a complete picture of a situation, person, or event. Explanatory research aims to identify causes, reasons, and supporting evidence for explanations or predictions. Its purpose is to document correlations between different elements of the phenomenon being studied (Boru, 2018; Rahi, 2017). Explanatory study designs are typically used in quantitative research. Therefore, the study utilised the explanatory research design to achieve its objectives. The explanatory design was chosen because

the study sought to examine the relationship and causality between the financial soundness of the banking sector and stock returns in the Ghanaian context.

Data Sources and Description

Using monthly time series secondary data, this study investigated the relationship between the banking sector's financial soundness and stock returns in Ghana. These monthly data included GSE indexes such as the GSECI and the GSEFSI. It also includes seven BSFSIs such as NPL, ROE, ROA, CAR, CD, CLASL, and CLATA. Finally, it included two macroeconomic variables used as control variables: the inflation rate and the BoGCIEA as a measure of GDP.

Natural logarithms were employed in the study and forecasting. The natural logarithm is suitable when working with continuous data with positive values and allows for the transformation of skewed data to normal distribution making statistical analysis and exploring the correlations between variables easier (Cole & Altman, 2017). To accomplish this, the obtained monthly data on the banking sector's financial soundness and stock returns were cleaned by eliminating all unobserved data. As a result, 145 observations from January 2011 to December 2022 were examined. The selected period was determined by the continuous availability of data, which will allow for more accurate and valuable evaluations. The data covers periods of Ghana’s banking crisis in 2017, the impact of the COVID-19 pandemic, and Ghana’s financial crisis in 2022 resulting from the Russia-Ukraine war.

The data for the BSFSIs and the macroeconomic variables were sourced from the Bank of Ghana's website, and the stock returns were

obtained from Equity RT. See appendix 1 for more detailed information. The table below gives a summary of the variables discussed above.

Table 1: Data Source and Description

Variables	Measurement	Sources
Banking sector's financial soundness	1. CAR 2. NPL 3. CLATA 4. CLASL 5. CD 6. ROA 7. ROE	Bank of Ghana Website
Stock returns	1. GSECI 2. GSEFSI	Equity RT
Control Variables	1. Inflation Rate 2. BoGCIEA	Bank of Ghana Website

Source: Author's Construct (2023)

Data Processing and Analysis

The data for this study were processed using quantile regression and Conditional causality in quantile with R programming software. Quantile regression has the advantage of helping to identify specific levels of financial soundness that are associated with different levels of stock returns. The use of quantile regression will allow deriving conclusions about the relationship between the study's variables from a variety of quantiles, in contrast to other techniques that only give the average relationship between the variables. This is especially useful for making distinctions between market circumstances (Assifuah-Nunoo et al., 2022). Additionally, the conditional causality in quantiles will assist in determining if the independent variables have predictive abilities over the dependent variables across different quantiles.

Thus following the studies of (Alsubaie et al., 2022; Archer et al., 2022; Asafo-Adjei et al., 2022; Assifuah-Nunoo et al., 2022; Bossman et al., 2022; Kyei, Cantah, et al., 2023). For all the study's variables, the returns series were estimated using the natural logarithm of their monthly prices. The natural logarithm returns were estimated as:

$$lnR_t = lnP_t - lnP_{t-1} \quad (1)$$

Where, lnR_t represents the natural logarithm return at time t, P_t denotes the price at t and P_{t-1} illustrates the price at the preceding period (t-1).

Measurement of Variables

The study's variables are independent, dependent, and control variables. The independent variable is the banking sector's financial soundness measured by NPL, ROE, ROA, CAR, CD, CLASL, and CLATA. The dependent variable is the stock returns proxied by GSECI and the GSEFSI. The control variables consist of macroeconomic indicators including the inflation rate and the BoGCIEA as a measure of GDP.

Banking sector's financial soundness

Banking sector financial soundness described by Salina et al. (2020) refers to the situation in which the financial indicators that reflect a bank's capital adequacy, asset quality, liquidity, and efficiency fall within a specific domain. This is to ensure that a bank gains the ability to endure unfavorable market conditions. The financial soundness of the banking sector mirrors the economic, social, political, and financial conditions prevailing in a country.

According to Abbas and Hassan (2022) and Ahmet (2022), the banking sector's financial soundness is the ability to maintain a stable and healthy financial system, facilitate the efficient allocation of resources for production,

effectively manage potential risks, and improve the effectiveness of monetary policies. According to Almahadin and Tuna (2017), a sound banking sector is crucial for the overall well-being of a country's financial systems. This means that a country's banking sector must be financially strong and capable of overcoming economic challenges to ensure its financial system's overall stability. Thus, this study adopts the concepts of these definitions.

Capital adequacy ratio (CAR)

CAR assesses a bank's soundness based on its capital (Hajar & Tho'in, 2020a). The ratio analyzes the connection between a bank's capital and the degree of risk associated with its assets. This ratio encourages banks to maintain a strong capital foundation, which can improve their financial resilience and ability to resist economic and financial shocks like the 2008 global recession. Banks with higher levels of capitalization can better deal with moments of financial turbulence in the economy. A higher CAR indicates that a bank has a strong financial position and can absorb unexpected losses without risking insolvency. Conversely, a lower CAR indicates that a bank is more susceptible to financial distress and may have difficulty meeting its obligations. Thus, the study uses CAR as a proxy for capital adequacy in measuring banking sector financial soundness.

Non-Performing Loans (NPL)

NPL is a standard asset quality metric for banks, which indicates the overall health of a bank's loan portfolio (Davies, 2011). It denotes the percentage of loans in a bank's portfolio that are not producing income because they are in default or are unlikely to be repaid. This ratio is an essential indication of a bank's financial health since it indicates the loan

quality and the benefits of the bank's risk management practices. A high NPL indicates the bank's vulnerability to increased credit risk and may struggle to generate profits from its loan portfolio. A high NPL may also signal that a bank should make extra provisions for bad loans which can harm its profitability, liquidity, and capital position (Wapmuk, 2017). Consequently, this study adopts NPL classified under asset quality as a proxy to evaluate the financial soundness of the banking sector.

Core liquid assets to total assets (CLATA)

CLATA demonstrates the ability of banks to handle unexpected financial demands (Asian Development Bank, 2015; Davies, 2011; Jnr et al., 2014). Accordingly, this study adopts CLATA as a measurement of the banking sector's financial soundness

Core liquid assets to short-term liabilities (CLASL)

CLASL measures the liquidity gap between assets and liabilities as well as assesses the liquid assets' capacity to meet short-term fund withdrawals (Asian Development Bank, 2015; Davies, 2011; Jnr et al., 2014). Accordingly, this study adopts CLASL as a measurement of the banking sector's financial soundness

Credit to deposit (CD)

CD measures the potential of a bank to meet its financial obligations towards depositors. According to Abbas and Hassan (2022), the CD ratio is a frequently used metric in the banking sector to assess liquidity risk and promote financial stability and soundness. It is a significant indicator that represents the proportion of a bank’s loan with its deposit and is regularly monitored by regulators and financial institutions to manage risk and ensure

the financial system's integrity. The ratio compares banks' outstanding loans to their total deposits.

A very high CD implies that a bank's lending exceeds what it has in deposits. This can be challenging, as such, banks may not have enough funds to fulfill their financial obligations in a situation of a bank run (Agyemang et al., 2020). An extremely low CD ratio, on the other hand, may signal that the bank is not fully utilising its lending capacity and thus missing possible revenues (Qamruzzaman, 2014). Accordingly, this study adopts CD as a measurement of the banking sector's financial soundness

Return on asset (ROA)

According to Qamruzzaman (2014), ROA evaluates the efficiency with which a company's assets produce revenue. The ROA reveals how effectively management uses its resources to give rise to profit. According to Albulescu (2015), ROA is a financial metric that determines the profitability of the banking sector. Jnr et al. (2014) assert that ROA measures the profits earned by a bank's assets. This metric is useful for determining how effectively a bank utilises its assets to attain profitability. Hence, this study makes use of the ROA as a gauge of the banking sector's financial soundness.

Return on equity (ROE)

According to Qamruzzaman (2014), ROE measures a company's profitability by calculating the amount of profit generated from shared stockholder investments. According to Albulescu (2015), ROE is a financial indicator that measures a banking sector's profitability by calculating how much profit was made per unit of shareholder investment. The ROE allows investors and analysts to assess how well a bank uses shareholder capital to

produce profits. Jnr et al. (2014) also assert that ROE depicts the profit a bank makes to the total amount of shareholder equity. This metric indicates how effectively the bank utilises equity capital to generate profits. A higher ROE typically implies better performance since it reflects the returns and potential growth of the investors' investments (Agyemang et al., 2020). Banks with a high ROE are also more apt to generate cash internally. Hence, this study makes use of the ROE as an indicator of the banking sector's financial soundness.

Stock returns

Sock returns defined by Alpiani et al. (2022) are the profits or losses made by investors over a set period, indicating the rate of return on their assets. Stock returns consist of a variety of components, including dividends paid to investors in cash, shares, and property, as well as capital gains. These components indicate investors' profits or losses on stock investments. According to Nyaga (2014), the difference between a stock's current price and the price at which it was originally purchased by the investor is referred to as a stock return. It may be expressed as a percentage or in absolute terms of total investments. This study employs the same definitions and measurement methods as indicated.

Ghana Stock Exchange Composite Index (GSECI)

The GSECI is the primary index for the GSE. It reflects the performance of the whole market (Numapau Gyamfi, 2018) and is a yardstick that gauges the performance of listed companies (Ofori-Boateng et al., 2022). This index is a market-capitalization weighted of all listed firms on the stock exchange. The GSECI comprises diverse segments of the Ghanaian economy

such as manufacturing, agriculture financials, mining and exploration, oil and gas, utilities, and many more (Idun et al., 2022). The study seeks to employ GSECI as a representation of stock returns from January 2011 to December 2022.

Ghana Stock Exchange Financial Stock Index (GSEFSI)

The GSEFSI is a subset of the GSECI (Owusu Junior et al., 2018) but includes stocks from the financial sector, particularly those from the banking and insurance sectors, and its components. The study seeks to employ GSEFSI as a representation of stock returns from January 2011 to December 2022.

Inflation rate

Inflation is a continuous rise in the general price levels of goods that over time leads to a devaluation of a country's currency (Arhenful et al., 2022; Iqmal & Putra, 2020) and is usually expressed in terms of an annual percentage rate of change (Okyere & Mensah, 2022). Arhenful et al. (2022) contend that the relationship that exists between inflation rate and stock prices is ambiguous. That is, it could vary between positive and negative contingent on the conditions. According to theories such as the generalized Fisher hypothesis, when the inflation rate is high, investors transfer from financial to real assets. As a result, because equities reflect claims on actual assets, they function as inflation hedges, suggesting that stock price has a positive link with the inflation rate. Consequently, the study takes into account the monthly inflation rate of Ghana.

Bank of Ghana Composite Index of Economic Activity (BoGCIEA)

The Composite Index of Economic Activity (CIEA) represents a single value that offers perception into the existing state and projected course of an

economy, providing valuable insight as to where the economy is headed (Thompson & Talafha, 2017). According to the research (Anguyo, 2011), it is a variable that is highly associated with present levels of economic activity (such as real GDP). The index forecasts the direction and flow of economic activity (Takyi et al., 2023) on a timely basis (Boateng et al., 2022).

The emergence of the CIEA came about as a reflection of cohesive measures and a broader range of economic data from real, monetary, fiscal, and external sectors to address issues provided by individual indicator analysis (Dzigbede & Pathak, 2020; Nxumalo & Bhangu, 2023; Thompson & Talafha, 2017). Consequently, the study takes into account the monthly real sector BoGCIEA.

Model Specification

The study employed quantile regression to evaluate the relationship between banking sector financial soundness and stock returns. Additionally, conditional causality in quantile was employed to examine the predictive potential of banking sector financial soundness on stock returns.

Quantile regression

The study examined the relationship between the banking sector's financial soundness and stock returns in Ghana while accounting for the inflation rate and the BoGCIEA. The quantile regression approach was employed for the analysis. Quantile regression provides an information advantage (Silvia, 2019). That is, it demonstrates how an independent variable affects the conditional distribution of a dependent variable, thus revealing vulnerabilities that might be hidden in a mean-focused analysis and allowing for tailored strategies. This approach is also useful when dealing with time

series data that does not follow a normal distribution. Thus, improving the accuracy and reliability of policy recommendations based on the study's findings. In such cases, the coefficient from the mean equation of the Ordinary Least Square (OLS) technique may not be accurate and reliable (Koenker & Bassett, Jr, 1978). The model for OLS is presented as:

$$SR_t = \beta_0 + \beta_1 CAR_t + \beta_2 NPL_t + \beta_3 ROA_t + \beta_4 ROE_t + \beta_5 CD_t + \beta_6 CLATA_t + \beta_7 CLASL_t + \beta_8 INF_t + \beta_9 BoGCIEA_t + \mu_t \quad (2)$$

where, SR_t represents stock returns at time t, CAR_t , NPL_t, ROA_t, ROE_t, CD_t $CLATA_t$, and $CLASL_t$ represents Capital Adequacy Ratio, Non-performing Loans, Return on Assets, Return on Equity, Credit to Deposit, Core Liquid Assets to Total Assets, and Core Liquid Assets to Short-term Liabilities respectively at period t. INF_t represents inflation rate at period t and $BoGCIEA_t$ represents the Bank of Ghana Composite Index of Economic Activity at period t. β_0 Is the intercept, β_1 to β_9 represents the coefficients associated with each independent variable and μ_t is the residual at period t.

The model for quantile regression is presented as:

$$SR_t = \beta_0(\theta) + \beta_1 CAR_t(\theta) + \beta_2 NPL_t(\theta) + \beta_3 ROA_t(\theta) + \beta_4 ROE_t(\theta) + \beta_5 CD_t(\theta) + \beta_6 CLATA_t(\theta) + \beta_7 CLASL_t(\theta) + \beta_8 INF_t(\theta) + \beta_9 BoGCIEA_t(\theta) + \mu_t(\theta) \quad (3)$$

where, SR_t represents stock return at time t, CAR_t NPL_t ROA_t ROE_t CD_t $CLATA_t$ $CLASL_t$ represents Capital Adequacy Ratio, Non-performing Loans, Return on Assets, Return on Equity, Credit to Deposit, Core Liquid Assets to Total Assets, and Core Liquid Assets to Short-term Liabilities respectively at period t. INF_t represents inflation rate at period t and $BoGCIEA_t$ represents the Bank of Ghana Composite Index of Economic Activity at period t.

Moreover, θ corresponds to the θth quantile of the predictors, β represents the coefficients that need to be calculated for each quantile and μ_t represents the residual at period t in the absence of a predetermined form of distribution.

Previous studies (Archer et al., 2022; Assifuah-Nunoo et al., 2022; Nusair & Al-Khasawneh, 2018) utilised the quantile regression approach to demonstrate the usefulness of the quantile regression approach over the Ordinary Least Square approach. The quantile regression approach proposed by Koenker and Bassett (1978) examines how a group of independent variables relates to specific locations within the distribution of the dependent variable. As a result, it provides a more extensive understanding of the relationship than the practices that only consider the dependent variable's conditional mean. Quantile regression provides a description of the entire conditional distribution of the dependent variable and the predictions made using this approach are less sensitive to extreme values in the response variable. The equations that most accurately represents the quantile regression model are as follows:

$$Y_t(\theta|X) = \beta(\theta)X_t' + \mu_t(\theta) \qquad (4)$$

where, $Y_t(\theta|\mathrm{X})$ represents the value of the response variable Y_t at the θth quantile given the predictor variables X. $\beta(\theta)$ represents the coefficient vector specific to the θth quantile. X_t , represents the vector of predictor variables and μ_t represents error term specific to θth quantile at period t.

The relationships between the financial soundness of the banking sector and stock returns were examined throughout 19 quantiles, ranging from 0.05th to 0.95th. The chosen quantiles were used to assess whether fluctuations in the financial soundness of the banking sector consistently affect

stock returns over time. As a result, three different economic conditions were applied depending on the study's quantiles. According to previous studies conducted by Archer et al. (2022) & Assifuah-Nunoo et al. (2022), the quantiles used in this research are defined as stress (0.05-0.35), normal (0.40-0.65), and boom (0.70-0.95).

Conditional causality in quantile

The study employed the non-linear causality in quantile approach introduced by Balcilar et al. (2016, 2017) in examining the conditional causality between the financial soundness of the banking sector and stock returns across diverse distributions following prior studies of Alsubaie et al. (2022); Archer et al. (2022); Jena et al. (2019). The study aims to examine whether y_t is not caused by x_t at different quantiles (θ) by analyzing a lag-vector of $\{y_{t-1}, \dots, y_{t-p}, x_{t-1}, \dots, x_{t-p}\}$ if,

$$Q_\theta(y_t | y_{t-1}, \dots, y_{t-p}, x_{t-1}, \dots, x_{t-p}) = Q_\theta(y_t | y_{t-1}, \dots, y_{t-p}) \qquad (5)$$

However, x_t causes y_t in the θ-quantile based on

$\{y_{t-1}, \dots, y_{t-p}, x_{t-1}, \dots, x_{t-p}\}$ If,

$$Q_\theta(y_t | y_{t-1}, \dots, y_{t-p}, x_{t-1}, \dots, x_{t-p}) \neq Q_\theta(y_t | y_{t-1}, \dots, y_{t-p}) \qquad (6)$$

Where $Q_\theta(y_t|\cdot)$ denotes the θ-quantile ofy_t. It is important to highlight that the conditional quantiles ofy_t, $Q_\theta(y_t|\cdot)$ rely on t whereas the quantiles range between 0 and 1.

By defining the vectors $Y_{t-1} = (y_{t-1}, \dots, y_{t-p})$, $X_{t-1} = (x_{t-1}, \dots, x_{t-p})$, and $\gamma_{t-1} = (X_t, Y_t)$, the study establishes the functions $F_{yt|\gamma_{t-1}}(y_t|\gamma_{t-1})$ and $F_{yt|Y_{t-1}}(y_t|Y_{t-1})$ as the conditional distribution functions of y_t dependent on vectors γ_{t-1} and Y_{t-1} analogously. According to Jena et al. (2019), the

hypothesis related to causality in quantile can be expressed as equations (7) and (8) below:

$$H_0: P\{F_{yt|\gamma_{t-1}}\{Q_\theta(Y_{t-1})|\gamma_{t-1}\} = \theta\} = 1 \quad (7)$$

$$H_0: P\{F_{yt|\gamma_{t-1}}\{Q_\theta(Y_{t-1})|\gamma_{t-1}\} = \theta\} < 1 \quad (8)$$

The study tests that SR_t is not caused by $BSFSIs$ at various θ-quantile based on the lag-vector of $\{SR_{t-1}, \dots, SR_{t-p}, BSFSIs_{t-1}, \dots, BSFSIs_{t-p}\}$ if

$$Q_\theta(SR_t|SR_{t-1}, \dots, SR_{t-p}, BSFSIs_{t-1}, \dots, BSFSIs_{t-p}) =$$

$$Q_\theta(SR_t|SR_{t-1}, \dots, SR_{t-p}) \quad (9)$$

However, $BSFSIs_t$ causes SR_t in the θ-quantile based on $\{SR_{t-1}, \dots, SR_{t-p}, BSFSIs_{t-1}, \dots, BSFSIs_{t-p}\}$ If,

$$Q_\theta(SR_t|SR_{t-1}, \dots, SR_{t-p}, BSFSIs_{t-1}, \dots, BSFSIs_{t-p}) \neq$$

$$Q_\theta(SR_t|SR_{t-1}, \dots, SR_{t-p}) \quad (10)$$

Where SR_t denotes stock returns at time t, BSFSIs_t represents Banking Sector Financial Soundness Indicators at period t.

Chapter Summary

The chapter covered the study's research methods. Thus, the research paradigm, approach, design, data source, and description, data processing and analysis, variable measurements, and model specification were investigated. The positivist paradigm, quantitative approach, and explanatory design guided the study. In achieving the study's objectives, quantile regression was used for objective one and conditional causality in quantile for objective two.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This study examined the financial soundness of the banking sector and stock returns in Ghana. In regards to that, the chapter focused on the analysis of data utilising quantile regression and conditional causality in quantile techniques and the discussion of results. The chapter starts with descriptive statistics of the data employed in running the analyses to fulfill the objectives of the study. Subsequently, the key findings are discussed, which are the relationship between banking sector financial soundness and stock and the conditional causality between banking sector financial soundness and stock returns in Ghana, and finally an overview of the research findings.

Descriptive Statistics

Figure 4 displays the graphical representations of the data series illustrating the BSFSIs and stock returns while controlling for inflation and BoGCIEA. The plots demonstrate the volatility and instability observed within the financial sector of Ghana. Volatility is a crucial indicator of financial risks within financial markets (Kuranchie-Pong & Forson, 2022).

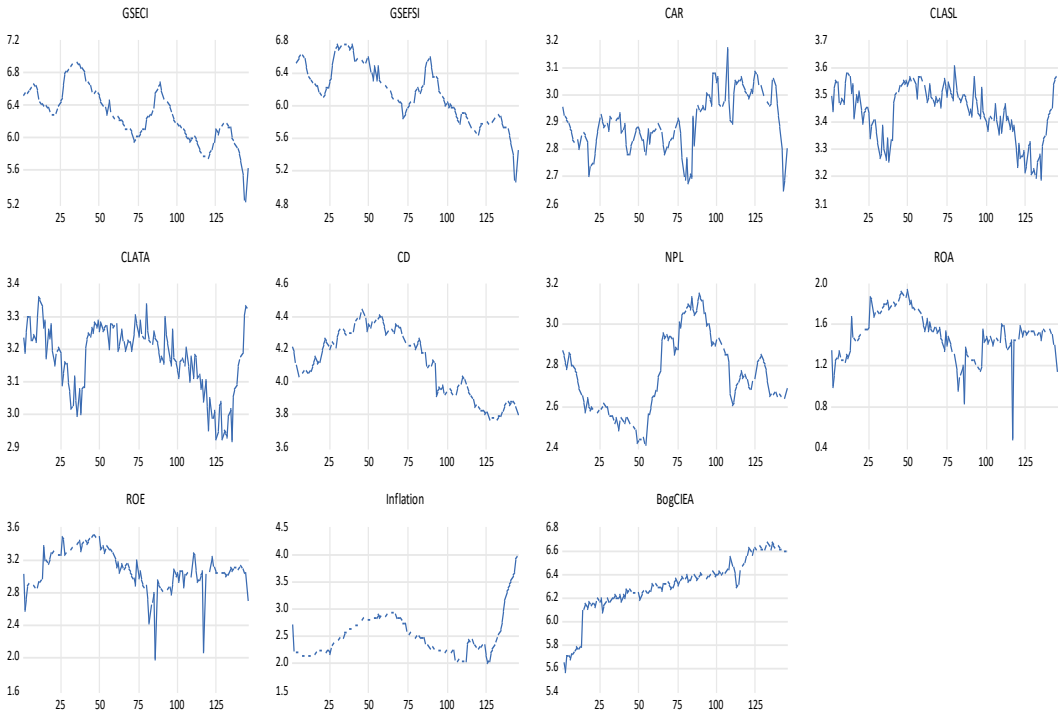


Figure 4: Graphs illustrating the monthly natural logarithm of the data series. Source: Author's construct (2023)

Table 2 provides the descriptive statistics for the variables employed in the study. These include banking sector financial soundness (CAR, CLASL, CLATA, CD, NPL, ROA, and ROE), stock returns (GSECI and GSEFSI), and control variables (inflation rate and BoGCIEA). The results presented in the table ranged from January 2011 to December 2022 with 145 observations.

Table 2: Descriptive Statistics

	GSECI	GSEFSI	CAR	CLASL	CLATA	CD	NPL	ROA	ROE	Inflation	BoGCIEA
Mean	6.282	6.164	2.900	3.437	3.175	4.112	2.747	1.492	3.086	2.515	6.301
Median	6.280	6.164	2.895	3.460	3.195	4.127	2.725	1.504	3.063	2.416	6.323
Maximum	6.944	6.762	3.173	3.602	3.359	4.442	3.155	1.934	3.527	3.991	6.673
Minimum	5.236	5.066	2.652	3.186	2.922	3.764	2.415	0.476	1.991	2.015	5.556
Std. Dev.	0.333	0.357	0.100	0.099	0.104	0.199	0.189	0.230	0.247	0.382	0.243
Skewness	-0.229	-0.311	-0.049	-0.691	-0.710	-0.186	0.320	-0.685	-1.034	1.397	-0.988
Kurtosis	3.186	2.801	2.738	2.678	2.750	1.683	2.163	4.879	6.267	5.377	4.125
Jarque-Bera	1.477	2.581	0.472	12.167***	12.549***	11.314***	6.701**	32.669***	90.326***	81.333***	31.254***
KPSS	0.078***	0.071***	0.056***	0.103***	0.111***	0.211***	0.146***	0.102***	0.073***	0.454***	0.267***
PP	-7.100***	-8.834***	-13.336***	-16.420***	-16.389***	-11.626***	-11.376***	-19.113***	-22.615***	-10.865***	-14.861***
Sum	910.873	893.764	420.572	498.354	460.321	596.190	398.267	216.294	447.444	364.675	913.704
Sum Sq. Dev.	15.968	18.341	1.443	1.410	1.557	5.728	5.141	7.610	8.750	21.031	8.525
Observations	145	145	145	145	145	145	145	145	145	145	145

Source: Author's construct (2023)
Note: [***, **, and *] represent significance levels of 1%, 5%, and 10%, respectively.

The BSFSIs, stock returns, and control variables all exhibit positive average values across the sampled period. Thus, signifying positive returns. Among these, BoGCIEA stands out with a significantly higher average value, while ROA has the lowest average value. The median, maximum, and minimum values of all the variables are greater than zero, indicating a tendency for positive values.

The inflation variable has the highest standard deviation, recorded at 0.382, indicating the greatest level of variability or dispersion among the data points as well as exhibiting rapid fluctuations compared to the other variables included in the study. On the other hand, the CLASL variable has the lowest standard deviation, measuring at 0.099, suggesting relatively less variability or dispersion in its values. The standard deviation for all variables is lower than their mean indicating that the data points are similar in magnitude and are less prone to significant fluctuations and deviations from the mean.

The inflation rate and NPL display right skewness while the other variables are skewed to the left. The right skewness in the inflation rate and NPL indicates an increment in inflationary pressures and default loans over the period. The negative or left skewness suggests that there have been more instances of declines or downward movements in those variables over the years. Overall, the skewness patterns indicate that the data distributions deviate from symmetry and exhibit asymmetry. The kurtosis values of GSECI, ROA, ROE, inflation rate, and BoGCIEA indicate that they follow a leptokurtic distribution, which means they have a more peaked shape and heavier tails compared to a normal distribution. On the other hand, the remaining variables exhibit a platykurtic distribution, as their kurtosis values

are less than 3. This suggests lighter tails and a flatter peak compared to a normal distribution. Thus indicating that the data series deviates from a normal distribution.

The Jarque-Bera statistics indicate that, except for GSECI, GSEFSI, and CAR, all the variables in the study are found not to follow a normal distribution. The GSECI and GSEFSI following a normal distribution indicate the probability of observing either positive and negative returns or price movements. This suggests unpredictability or randomness in the GSE over the period which is associated with the efficient market hypothesis (Fama, 1970). In addition, CAR following a normal distribution suggests that most financial intuitions listed on the GSE have a similar level of capital adequacy.

The values of the Kwiatkowski- Phillips –Schmidt –Shin (KPSS) statistics by Kwiatkowski et al. (1992) at the first difference of all the study's variables series were found to be smaller than their corresponding critical values at 0.01 level of significance. Consequently. We fail to reject the null hypothesis of stationarity at a 1% level of significance. This indicates that the first differenced series of all the variables exhibit stationarity. The researcher further conducted a Phillips-Perron (PP) test by Phillips (1988) to find a robust conclusion about the stationarity of the data series employed in the study. The probability of the PP test statistics at the first difference of all the study's variables was found to be lower than their corresponding critical values at all significance levels providing evidence to reject the null hypothesis of non-stationarity. Therefore, the first difference of all the variables exhibits stationarity.

Table 3 of the study shows the correlation matrix between the study's variables. The correlation matrix provides insight into the connections between the examined variables of the study, helping the researcher to understand and interpret the data patterns and trends as well as assess portfolio diversifications. The correlation matrix includes coefficients for the study's variables, including CAR, CLASL, CLATA, CD, NPL, ROA, ROE, GSECI, GSEFSI, inflation rate, and BoGCIEA.

Table 3: Correlation Matrix

Covariance Analysis: Ordinary
Date: 04/28/23 Time: 13:29
Sample: 1 145
Included observations: 145
Correlation

Probability	BOGCIEA	CAR	CD	CLASL	CLATA	GSECI	GSEFSI	INFLATION	NPL	ROA	ROE
BOGCIEA	1.000										

CAR	0.357***	1.000									
	0.000	-----									
CD	-0.484***	-0.591***	1.000								
	0.000	0.000	-----								
CLASL	-0.446***	-0.575***	0.506***	1.000							
	0.000	0.000	0.000	-----							
CLATA	-0.483***	-0.618***	0.491***	0.789***	1.000						
	0.000	0.000	0.000	0.000	-----						
GSECI	-0.622***	-0.177**	0.591***	0.069	0.091	1.000					
	0.000	0.033	0.000	0.408	0.277	-----					

Table 3: Cont'd

GSEFSI	-0.690***	-0.244***	0.688***	0.217***	0.228***	0.875***	1.000				
	0.000	0.003	0.000	0.009	0.006	0.000	-----				
INFLATION	0.284***	-0.339***	0.179**	0.234***	0.217***	-0.319***	-0.263***	1.000			
	0.001	0.000	0.032	0.005	0.009	0.000	0.001	-----			
NPL	0.146*	0.113	-0.270***	0.066	0.069	-0.194**	-0.193**	-0.251***	1.000		
	0.080	0.176	0.001	0.429	0.411	0.020	0.020	0.002	-----		
ROA	0.039	-0.046	0.431***	-0.110	-0.119	0.283***	0.276***	0.256***	-0.701	1.000	
	0.644	0.581	0.000	0.188	0.153	0.001	0.001	0.002	0.000	-----	
ROE	-0.061	-0.093	0.417***	-0.066	-0.061	0.294***	0.287***	0.185**	-0.743***	0.961***	1.000
	0.468	0.267	0.000	0.432	0.463	0.000	0.001	0.026	0.000	0.000	-----

Source: Author's construct (2023)
Note: [***, **, and *] represents significance levels of 1%, 5%, and 10%, respectively

The correlation matrix above presents the pairwise correlations between the variables employed in the study. These include banking sector financial soundness (CAR, CLASL, CLATA, CD, NPL, ROA, and ROE), stock returns (GSECI and GSEFSI), and control variables (inflation rate and BoGCIEA). The results presented in the table ranged from January 2011 to December 2022. The correlation coefficients ranged from -0.061 to 0.875. From the correlation matrix, it is seen that GSECI has a positive relationship with CLASL, and CLATA and a significant positive relationship with CD, ROA, and ROE. Conversely, GSECI has a negative significant relationship with CAR, NPL, BoGCIEA, and inflation.

Furthermore, the correlations between GSEFSI and the other variables follow a similar trajectory as that of GSECI but with significant associations across all. These findings suggest that changes in GSECI and GSEFSI are associated with coinciding changes in these variables, indicating a significant interplay between stock returns and the other variables. Additionally, GSECI has a significant positive correlation with GSEFSI, indicating that an increase in the performance of GSEFI corresponds with an increase in the performance of GSECI. Thus confirming that the GSEFSI is a subset of the GSECI (Owusu Junior et al., 2018).

Regression Results

The relationship between banking sector financial soundness and stock returns

In establishing the relationship between the banking sector's financial soundness and stock returns, the study tested evidence for the linear

relationships between the study's variables. Table 4 of the study shows the OLS output.

Table 4: Ordinary Least Squares Results

Variables	GSECI	GSEFSI
CAR	0.906***	0.206***
CLASL	-1.203	-0.423
CLATA	1.091	0.495
CD	0.684***	0.910***
NPL	0.208	0.177
ROA	0.754**	0.722**
ROE	-0.682**	-0.656**
Inflation	0.022	0.000
BoGCIEA	0.432***	0.101

Source: Author's Construct (2023)
Note: [***, **, and *] represents significance levels of 1%, 5%, and 10%, respectively.

From the table above, CAR, CLATA, CD, ROA, NPL, Inflation, and BoGCIEA have positive relationships with GSECI with CAR, CD, ROA, and BoGCIEA being statistically significant. Conversely, CLASL and ROE have negative relationships with GSECI with ROE being statistically significant. Additionally, CAR, CLATA, CD, NPL, ROA, and BoGCIEA have positive relationships with GSEFSI where CAR, CD, and ROA are statistically significant. On the contrary, CLASL, ROE, and Inflation have negative relationships with GSEFSI with ROE being statistically significant. The positive relationships translate into advantageous effects of the variables on the performance of GSECI and GSEFSI. This implies that under the conditions of an increase in the variables, the GSECI and GSEFSI will see growth or high returns and vice versa.

In addition, the negative relationships translate into the detrimental effects of the variables on the performance of GSECI and GSEFSI. This implies that under the conditions of an increase in the variables, the GSECI and GSEFSI exhibit declines or low returns and vice versa.

Quantile regression

From the descriptive statistics in Table 2, it was observed that the financial data series exhibited characteristics of heterogeneity, skewness, extreme values, and deviations from normality following Zhu et al. (2016). To handle such problems, it is imperative to use a more robust technique, such as quantile regression (Assifuah-Nunoo et al., 2022). Tables 5 and 6 present the relationship between the banking sector's financial soundness and stock returns across quantiles. Specifically, Table 5, displays the effects of BSFSIs on the GSECI while Table 6, displays the effects of these indicators on the GSEFSI.

Table 5: Effects of banking sector financial soundness on the Ghana Stock Exchange Composite Index

Quantiles	CAR	CLASL	CLATA	CD	NPL	ROA	ROE	Inflation	BoGCIEA
0.05	1.013**	-1.177	0.731	1.195***	-0.006	-0.687	1.115**	-0.042	-0.390*
0.1	1.692***	-4.406*	3.909*	1.383***	-0.137	-0.417	0.677*	-0.005	-0.463**
0.15	1.823***	-4.767***	4.221***	1.436***	-0.207	-0.411	0.540	-0.016	-0.415**
0.2	1.482***	-4.472**	4.624**	1.124***	-0.042	-0.113	0.397	-0.166*	-0.422**
0.25	1.612***	-4.839*	4.856**	1.235***	-0.093	-0.181	0.325	-0.145	-0.404**
0,3	1.729***	-4.253	4.295	1.233***	-0.173	-0.177	0.237	-0.146	-0.411**
0.35	1.709***	-4.656	4.627*	1.285***	-0.233	-0.227	0.243	-0.188*	-0.327*
0.4	1.598***	-3.721	3.574	1.362***	-0.112*	-0.043	0.152	-0.181*	-0.352*
0.45	1.616***	-5.066	4.688	1.498***	-0.091	-0.089	0.174	-0.209*	-0.268
0,5	1.544***	-5.102	4.447	1.670***	0.035	-0.378	0.352	-0.166	-0.291
0.55	1.465***	-5.071*	4.424	1.589***	0.219	-0.248	0.361	-0.126	-0.334
0.6	1.599***	-6.276**	5.668*	1.620***	0.245	-0.031	0.124	-0.158	-0.313
0.65	1.601***	-5.092*	4.407	1.551***	0.453	-0.097	0.282	-0.119	-0.444**
0.7	1.587***	-6.699**	6.176**	1.585***	0.383	0.476	-0.316	-0.240**	-0.230
0.75	1.695***	-7.429***	6.829**	1.662***	0.399	0.481	-0.342	-0.242**	-0.252
0.8	1.770***	-7.958***	7.256***	1.731***	0.369	0.469	-0.334	-0.225*	-0.249*
0.85	1.812***	-8.026***	7.153***	1.815***	0.460**	0.431	-0.282	-0.203*	-0.295**
0.9	1.917***	-6.734***	6.095***	1.565***	0.330	0.400	-0.279	-0.086	-0.329**
0.95	1.955***	-7.716***	7.121***	1.545***	0.401**	0.587	-0.375	-0.087	-0.342***

Source: Author's construct (2023)

Note: [***, **, and *] represents significance levels of 1%, 5%, and 10%, respectively

From Table 5 above, CAR and CD of the banking sector financial soundness indicators show significant positive effects at 1% significant levels across all conditional distributions of GSECI. Except for the 0,5th quantile where the significant effect for CAR is established at 5%. As previously stated, CAR measures the health of the banking sector based on its capital. Thus, a statistically significant positive relationship between CAR and GSECI means that an increase in the performance of CAR causes the GSECI to perform better with higher values and positive returns across all economic conditions. It further implies that, despite economic turmoil and unfavourable situations, Ghana's banking sector has maintained a strong capital base over the years. The result aligns with previous studies conducted by Akbar (2019); Hajar et al. (2020); Iskandar (2020) where CAR was found to have a positive and significant effect on stock returns.

CD having a significant positive effect on the GSECI signifies that an increase in CD is associated with higher stock returns from the GSECI. Thus, when the banking sector extends more credit relative to their deposits, it stimulates economic activity, investment, and overall market sentiment, which in the end affects the performance of the GSECI positively. Generally, the relationship indicates that the availability of credit and the ability of companies to access financing through loans drive the performance of firms listed on the GSE and the overall market returns irrespective of the prevailing market conditions.

CLASL has negative effects on the GSECI across all quantiles. It has a statistically little effect of 10% significance across the quantiles of 0.1, 0.25, 0.55, and 0.65, a statistically middling effect of 5% significance across the

0.2nd, 0.6th, and 0.7th quantiles, and statistical huge effect of 1% significance across the 0.15th, as well as the higher quantiles from 0.75th to 0.95th. It also had non-significant effects at the 0.05th, 0.3rd, 0.35th, 0.4th, 0.45th, and 0.5th quantiles.

The significant negative effect of CLASL on the GSECI means they move in an opposite direction, that is, when CLASL increases the performance of the GSECI decreases. CLASL is a measure of a company's liquidity status by measuring the liquidity gap between assets and liabilities (Asian Development Bank, 2015; Davies, 2011; Jnr et al., 2014). A higher CLASL illustrates a stronger liquidity position, as the company possesses more liquid assets to meet its short-term obligations.

The negative relationship between CLASL and the GSECI shows that investors in Ghana may interpret a higher liquidity position as indicating lower profitability or growth prospects. They may believe that listed companies with a higher percentage of core liquid assets relative to short-term obligations are not deploying their resources efficiently to create higher profits. As a result, they may prefer to invest in other equities or sectors, causing the performance of the GSECI to fall. Also, according to the Asian Development Bank (2015), it is essential to maintain an appropriate amount of liquidity while avoiding excessive liquidity, as excess liquidity can depreciate the currency and eventually lead to inflation. Consequently, because listed companies play an indispensable role in the economy of Ghana, this negative effect on stock returns may reflect broader economic concerns across various economic conditions.

Furthermore, the effects may not hold under the different economic conditions across the quantiles where the association or effects were not found at any of the traditional levels of significance to be statistically significant.

CLATA has a positive effect on the GSECI at all quantiles. These effects are statistically minor at a 10% significance level across 0.1, 0.35, and 0.6 quantiles, statistically moderate at a 5% significance level across 0.2, 0.25, 0.7, and 0.75 quantiles, statistically enormous at 0.15, 0.8, 0.85, 0.9, and 0.95 quantiles and statistically insignificant across 0.05, 0.3, 0.4, 0.45, 0.5,0.55,0.65 quantiles. The significant positive effects of CLATA on the GSECI imply an increase in the proportion of CLATA relates to higher GSECI returns. This suggests that banks with a higher proportion of core liquid assets in relation to total assets are better able to manage their overall liquidity position, which will influence market confidence and in turn boost the performance of the GSECI. The positive relationship between CLATA and the GSECI shows that a higher proportion of CLATA may be regarded as a good signal by Ghanaian investors.

They may view it as a sign of financial stability, indicating that the listed companies have sufficient liquidity to satisfy their short-term obligations. This notion may attract investors and lead to an increasing value and performance of the GSECI. In the context of the statistically insignificant effect means that the noted positive effect of CLATA on the GSECI is likely due to chance or random fluctuations across those quantiles and their related economic conditions. The findings from CLASL and CLATA suggest that the liquidity position of Ghana's banking sector has a dual impact on the GSECI. The negative relationship between CLASL and GSECI indicates the

importance of managing liquidity risks while the positive relationship between CLATA and GSECI highlights the importance of maintaining a robust liquidity position to support market confidence and higher stock returns across all economic conditions.

NPL has negative effects on the GSECI in stressed economic conditions (0.05 - 0.35), and this effect extends somewhat into normal economic conditions (0.4 and 0.45). This translates into an increase in the performance of the GSECI associated with a decrease in the NPL of the banking sector in periods of economic stress and the early stages of normal economic conditions. NPLs are considered assets that are of low quality and can imply financial distress in the banking sector or the overall economy. The negative effects NPL has on the GSECI imply that investors in Ghana regard a lower level of NPLs as a positive sign for the listed companies and the banking sector's health and stability. When NPLs fall, it means that the risk of loan defaults and possible losses for banks falls. This, in turn, may strengthen investor confidence in the banking industry, resulting in more investment in stocks and a rise in the performance of the GSECI.

Furthermore, under both normal (0.5 - 0.65) and boom (0.70-0.95) economic conditions, NPL has a positive effect on the GSECI. This implies that even though the negative relationship persists into the early stage of the normal economic condition, moving further into the deep stages it interestingly changes into a positive relationship through to the period of economic expansion or boom. Thus, indicating that an increase in NPL is linked with a rise in the performance of the GSECI. This relationship may appear counterintuitive, given that non-performing loans often signal a higher

level of credit risk and future financial difficulties in the banking sector (Wapmuk, 2017). Except for 0.4 0.85, and 0.95, where the significance was proven at 10% and 5%, these effects were not statistically established. Thus the findings contradict that of (Alpiani et al., 2022) who found NPL to have a significant negative influence on stock returns.

ROA has negative effects on the GSECI during both the stress and the normal economic conditions and positive effects during the boom economic conditions. These effects were determined to be statistically insignificant at the standard levels of significance. The findings were found to conflict with those of (Akbar, 2019; Alpiani et al., 2022) who found ROA to have a positive and significant effect on stock prices. The negative effects indicate a reduction in profitability (ROA) corresponds to an increase in the performance of the GSECI. This negative effect implies that when ROA falls during stress and normal economic conditions, it may indicate issues or deficiencies in the financial health or performance of the listed companies. However, investors may consider other factors such as future growth potential, industry dynamics, market sentiment, or macroeconomic conditions that could influence the GSECI leading to a rise in the performance of GSECI.

However, the positive effects of ROA on the GSECI during boom economic conditions imply that an increase in profitability (ROA) corresponds to an increase in the performance of the GSECI. During the boom conditions of the economy, companies tend to make high profits from their assets, resulting in a higher ROA. Investors become willing to invest in stocks with a higher ROA, causing the performance of the GSECI to increase (Hertina & Saudi, 2019). Because there was no statistical evidence to validate their

significance, the observed effects (both negative and positive) during the economic conditions could have happened by chance. Hence inconsistent with the findings of (Hajar & Tho'in, 2020a).

ROE had positive effects on GSECI during the stress and normal economic conditions with statistical significance at the 0.05^{th} and 0.1^{th} quantile and negative effects during the boom economic conditions. The positive effects during the stress and the normal economic conditions demonstrate the increase in the returns and performance of the GSECI associated with higher levels of ROE. Thus, companies with high profitability (ROE) tend to have a positive impact on the GSE. These positive effects could be a reflection of market confidence and suggest opportunities for potentially high returns during the stress and normal economic conditions. However, the negative effects during the boom economic conditions are an indication of decreased stock returns and performance associated with lower levels of ROE. Thus, companies exhibiting lower profitability (ROE) may have negative impacts on the stock market, as investors may perceive such companies as less attractive investment opportunities resulting in fewer demands for their stocks and, ultimately, a drop in the performance of the GSECI. Furthermore, except for the 0.05th and 0.1th quantiles, where their impacts were statistically significant, the observed effects may occur at a probability. These findings did not support the previous work of (Bertuah & Sakti, 2019) who found ROE to have no effects on stock returns.

During all economic situations (0.05 - 0.95), the inflation rate has negative effects on the GSECI, with significance at the 0.2, 0.35, 0.4, 0.45, 0.7, 0.75, 0.8, and 0.85 quantiles. This suggests that as inflation increases

stock returns tend to decrease across economic conditions ranging from stress to normal and to boom conditions. The constancy of the negative effects across various economic conditions implies that inflation has a prevalent influence on the performance of the GSE. Consequently, these findings are inconsistent with those of (Awadzie & Garr, 2020; Bertuah & Sakti, 2019; Sampene et al., 2021) who found the inflation rate to have a positive effect on stock market performance but consistent with (Agyapong-Poku, 2022; Asiedu et al., 2021; Asravor & Fonu, 2021). The observed association between the GSECI and the inflation rate is not attributable to random chance at the specific quantiles where the effects are statistically significant.

BoGCIEA exhibits statistically significant negative effects on the GSECI under all economic conditions except at 0.45th, 0.5th, 0.55th, 0.6th, 0.7th, and 0.75th quantiles where their significance was not proven at any of the standard levels of significance. This suggests that fluctuations in Ghana's total economic activity level have a consistent and statistically significant impact on the GSECI's performance. Whether the economy is stressed, operating normally, or experiencing a boom, a decrease in the BoGCIEA is associated with an increase in the performance of the GSECI. A decrease in the BoGCIEA indicates a slowdown or contraction in economic activity. The negative association between the BoGCIEA and the GSECI implies that investors in Ghana see a weaker general economy as an opportunity to increase their stock market investments. This could be because investors believe that companies listed on the stock exchange can still produce profits and deliver returns even in a difficult economic situation.

As a result, investors may reallocate their capital from other sectors or assets to the stock market, causing the performance of the GSECI to rise. The lack of statistical significance at the quantiles where the effects were not statistically significant suggests that the impact of BoGCIEA on the GSE may not be consistent, implying a potential fluctuation in the connection or the influence of other factors at work during those periods.

Table 6: Effects of banking sector financial soundness on the Ghana Stock Exchange Financial Stocks Index

Quantiles	CAR	CLASL	CLATA	CD	NPL	ROA	ROE	Inflation	BoGCIEA
0.05	1.121**	-1.275	0.798	1.457***	-0.195	0.099	0.240	-0.061	-0.270
0.1	1.166**	-0.953	0.509	1.508***	-0.283	0.001	0.249	-0.060	-0.296
0.15	1.349***	-2.023	1.956	1.471***	-0.307	0.148	-0.022	-0.109	-0.365*
0.2	1.715***	-2.241	2.259	1.362***	-0.262	-0.046	0.069	-0.076	-0.521***
0.25	1.749***	-3.424	3.431*	1.449***	-0.282	-0.007	-0.018	-0.115	-0.477**
0.3	1.673***	-2.735	2.720	1.383***	-0.232	-0.006	0.065	-0.142*	-0.463***
0.35	1.672***	-3.096	3.130	1.382***	-0.208	0.072	-0.018	-0.172**	-0.446**
0.4	1.402***	-2.870	2.805	1.425***	-0.079	-0.040	0.119	-0.165*	-0.403**
0.45	1.302***	-3.287	3.054	1.546***	0.053	-0.116	0.180	-0.142*	-0.406**
0.5	1.286***	-3.322	2.978	1.654***	0.183	-0.038	0.116	-0.129	-0.455**
0.55	1.289***	-2.922	2.447	2.447***	0.254	-0.042	0.183	-0.135	-0.461**
0.6	1.451***	-3.207	2.727	1.641***	0.322	-0.019	0.170	-0.096	-0.555***
0.65	1.511***	-4.196*	3.708	1.696***	0.329	0.134	-0.014	-0.118	-0.510**
0.7	1.368***	-4.548**	4.026*	1.759***	0.430	0.256	-0.154	-0.108	-0.458**
0.75	1.641***	-5.254**	4.808*	1.821***	0.435	0.510	-0.406	-0.137	-0.553***
0.8	1.742***	-5.985**	5.444**	1.845***	0.424	0.499	-0.400	-0.141	-0.529***
0.85	1.813***	-6.610***	6.187**	1.728***	0.405*	0.487	-0.390	-0.041	-0.546***
0.9	1.632***	-5.073**	4.653*	1.664***	0.567**	0.540	-0.346	-0.019	-0.596***
0.95	1.726***	-4.610*	4.398*	1.457***	0.498**	0.771	-0.478	-0.077	-0.561***

Source: Author's construct (2023)

Note: [***, **, and *] represents significance of 1%, 5%, and 10%, respectively

Table 6 shows the influence of the banking sector's financial soundness on the GSEFI across quantiles. These effects are comparable to those observed on the GSECI but are interpreted in the context of the GSEFSI.

CAR has significant positive relationships with the GSEFSI across all economic conditions. This finding contradicts the findings of (Idun et al., 2022) who found negative comovement between the GSEFSI and the CAR. As previously stated, CAR measures the health of the banking sector based on its capital. The significant positive relationship between CAR and GSEFSI is an indication that when CAR increases there is a corresponding increase in the performance of GSEFSI across all economic conditions. This implies that irrespective of the economic conditions, investors may view banks with higher capital adequacy ratios as more stable, and secure. As a result, individuals may be more interested in investing in financial firms, thus driving up the value and performance of the GSEFSI.

CLASL has negative relationships with the GSEFI across all economic conditions with a proven significance across the standard levels of significance at the last quantile of the normal economic condition and throughout the boom economic condition. The negative relationship between CLASL and the GSEFSI shows that investors in Ghana may interpret a higher liquidity position as indicating lower profitability or growth prospects. They may believe that financial institutions with a higher percentage of core liquid assets relative to short-term obligations are not deploying their resources efficiently to create higher profits. As a result, they may opt to invest in other equities or sectors, causing the performance of the GSEFSI to fall.

Also, according to the Asian Development Bank (2015), it is essential to maintain an appropriate amount of liquidity while avoiding excessive liquidity, as excess liquidity can depreciate the currency and eventually lead to inflation. Consequently, because the banking sector plays a pivotal role in the economy of Ghana, this negative effect on stock returns may reflect broader economic concerns across various economic conditions. Furthermore, the effects may not hold under the different economic conditions across the quantiles where the association or effects were not found at any of the traditional levels of significance to be statistically significant.

CLATA has a positive relationship with the GSEFSI across all economic conditions. The positive relationships can be established statistically at the 0.25^{th} quantile and across the boom economic conditions (0.75 – 0.95). The positive relationship between CLATA and GSEFSI is a demonstration that an increase in CLATA is associated with an increase in the performance of the GSEFSI during all economic conditions. Investors perceive an increase in CLATA as a positive element of financial institutions. Because of the increased investor interest and demand for these financial institutions' stocks, the GSEFSI rises. In the context of the statistically insignificant effect means that the observed positive effect of CLATA on the GSECI is likely due to chance or random fluctuations across those quantiles and their related economic conditions.

The CD has a significant positive relationship with the GSEFSI across all economic conditions. This relationship suggests an increase in CD leads to an increase in the performance of financial stocks listed on the GSE regardless of the prevailing economic condition. This implies that banks with a greater

ratio are successfully deploying their deposit base through loan extension, which can lead to enhanced profitability and possible growth opportunities. Here, investors may interpret an increase in the CD as an indicator of the bank's capacity to attract creditworthy borrowers and earn interest income from lending activities. A higher CD suggests a robust loan portfolio, more lending activity, and prospective revenue development, all of which lead to financial stocks listed on the GSE experiencing an increase in their performance.

NPL has negative relationships with GSEFSI across the stressed economic conditions with an extension into an early stage of the normal economic condition and a positive relationship across the further stages of the normal and boom economic conditions. The negative relationships suggest that a lower NPL is associated with an increased performance of the financial stocks listed on the GSE under the stressed and the early stage of normal market conditions. The negative relationship between NPL and GSEFSI in the stress and the early stage of the normal economic condition suggests that investors perceive a decreased NPL as a good feature of financial institutions during economic difficulty. This implies that banks with lower proportions of NPLs in their loan portfolios are better positioned to handle credit risk and potential loan losses during economic downturns. Consequently, financial institutions with Lower NPLs may attract more investors to demand their stocks leading to a rise in the performance of the GSEFSI during the stressed economic conditions.

The positive relationships across the further stages of the normal and boom economic conditions indicate that an increase in NPL leads to an

increase in the performance of the GSEFSI during these periods. It suggests that investors view an increased level of NPL as a favourable element for financial institutions during periods of economic stability and growth. This shows that banks with a higher share of NPL in their loan portfolios can nonetheless have good performance and remain profitable. Investors may interpret an increased level of NPLs as an indication of increased lending activity and credit expansion, which can signal prospective revenue and profitability growth for financial institutions. Banks may take on greater risk and extend loans to borrowers with slightly higher credit risks under normal and boom economic situations. If, despite certain NPLs, these loans are performing well overall, it may be interpreted as an indicator of the bank's capacity to manage credit risk and generate profits.

As a result, financial institutions with an increased NPL may draw more investor demand for their stocks, resulting in a rise in the performance of the GSEFSI during normal and boom economic conditions.

ROA has positive relationships with the GSEFSI during the beginning and at the end of the stressed economic condition (0.05 - 0.15 and 0.35), the end of the normal economic condition (0.65), and throughout the boom economic condition (0.7-0.95). Furthermore, throughout the later stages of the stressed economic condition (0.2 - 0.3) and the early stages of the normal economic condition (0.4 - 0.6), ROA shows a negative relationship with GSEFSI. ROA having a positive effect on the GSEFSI means an increase in ROA translates into an increase in the performance of the GSEFSI under those specific economic conditions. This implies, that during the beginning and at the end of the challenging conditions, the end of the stable conditions, and

throughout the periods of economic expansions, banks with increased profitability measured by ROA are viewed as positive and attractive investments As a result, more investors will invest in the GSEFSI, resulting in its improved performance.

ROA having negative effects on the GSEFSI suggests that a decrease in the levels of ROA is associated with an increase in the performance of the GSEFSI in their identified economic conditions. When ROA falls during the later stages of the stress and early stages of normal economic conditions, it may indicate issues or deficiencies in the financial health or performance of the listed companies. Yet, investors can evaluate possible factors including future growth prospects, anticipated shifts, market outlook, or macroeconomic conditions that could influence the performance of the GSEFSI and continue to invest resulting in a rise in the performance of GSEFSI. Because there was no statistical evidence to validate their significance, the observed effects (both negative and positive) during the economic conditions could have happened by chance.

ROE exhibits positive effects on the GSEFSI during the stressed economic condition (0.05, 0.1, 0.2, and 0.3), and throughout the normal economic condition except at the end. ROE further exhibits negative relationships with the GSEFSI during the stressed economic conditions (0.15, 0.25, 0.35), the end of the normal economic condition (0.65), and throughout the boom economic conditions. The existence of positive effects of the ROE on the GSEFSI means an increase in ROE leads to an increase in the performance of the GSEFSI. This implies that financial institutions with increased profitability as reflected by ROE tend to perform well during both

the stressed (except at 0.15, 0.25, 0.35) and normal economic conditions (except 0.65). This in turn attracts investors and enhances their confidence resulting in an increased performance of the GSEFSI.

However, the existence of negative effects of the ROE on the GSEFSI means a decrease in ROE leads to an increase in the performance of the GSEFSI. This implies that financial institutions with decreased profitability measured by ROE during the stress, the end of the normal, and the boom economic conditions may be influenced by positive industry trends and market sentiments that shadow the impact of the decrease in the ROE. As a result, the GSEFSI will continue to see an increase in its performance despite the declines in ROE. Because there was no statistical evidence to validate their significance, the observed effects (both negative and positive) during the economic conditions could have happened by chance.

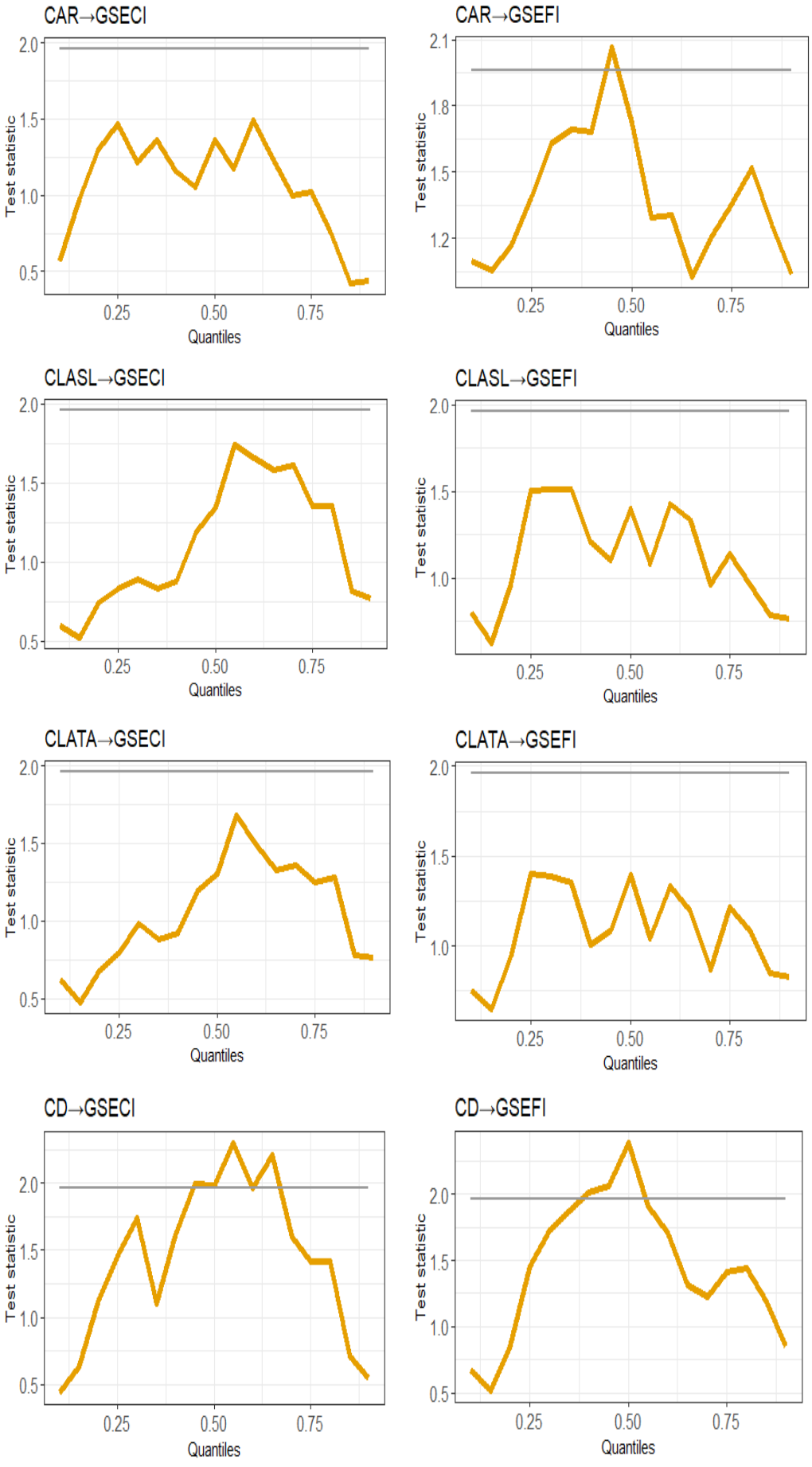
Inflation has negative effects on the GSEFSI across all economic conditions with the demonstrated significance of 5% and 10% at 0.3, 0.35, 0.4, and 0.45. The negative relationship suggests that as inflation rises the performance of the financial stocks tends to decline. This means that inflationary pressures in the economy can have adverse effects on the financial sector and dampen investor sentiment resulting in a decreased performance of the GSEFSI. These findings are inconsistent with that of (Arhenful et al., 2022) but consistent with (Agyapong-Poku, 2022; Asiedu et al., 2021; Asravor & Fonu, 2021)

BoGCIEA has a negative significant effect on the GSEFSI across all economic conditions except for 0.05 and 0.1 of the stressed economic condition where the relationship was not found to be significant. The negative

effect of BoGCIEA on the GSEFSI means that a decrease in BoGCIEA leads to an increase in the performance of the financial stocks listed on the GSE. This may be attributed to speculation and or market dynamics. This effect holds across various economic conditions except for the early stages of the stressed economic condition.

The conditional causality between banking sector financial soundness and stock returns

Figure 4 pictorially illustrates the results obtained from the conditional causality in quantile approach proposed by Balcilar et al. (2016, 2017) in examining how the financial soundness of the banking sector Granger causes the mean returns of the GSECI and GSEFSI across diverse distributions. Thus following prior studies of Alsubaie et al. (2022); Archer et al. (2022); Assifuah-Nunoo et al. (2022); Bossman et al. (2022); Jena et al. (2019). Unlike the standard causality test, which only considers the average, the conditional causality in quantiles technique incorporates all quantiles in the distribution (Jena et al., 2019). Accordingly, the conditional causality in quantile approach illustrates how causality works in both the stressed and the boom economic conditions in comparison to the normal economic conditions. The null hypothesis holds as stock returns are not caused by banking sector financial soundness indicators.



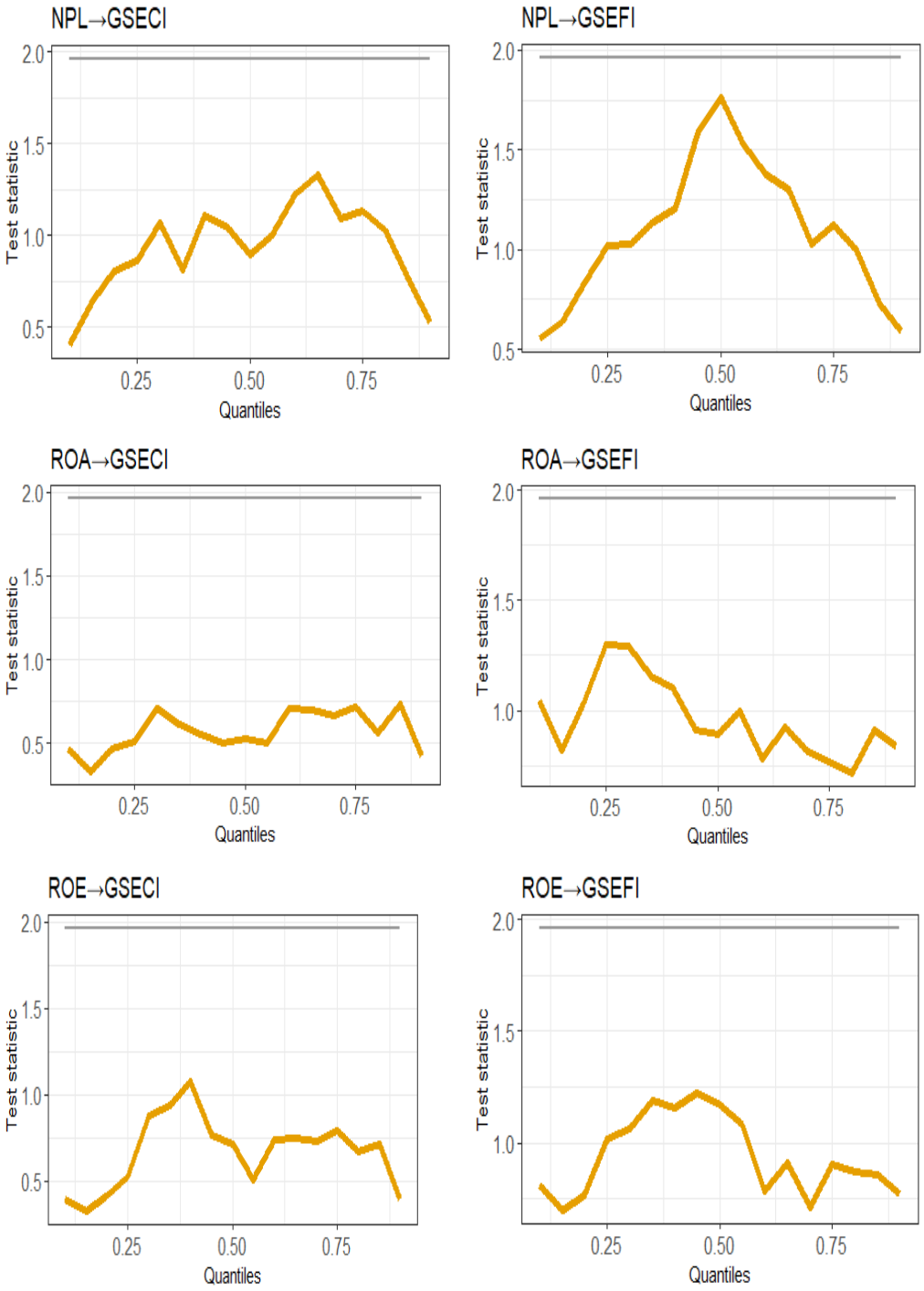


Figure 5: Causality-in mean test
Source: Author's Construct (2023)

From Figure 5 above, each of the plots has the test statistic on the Y-axis and the quantiles on the X–axis. The horizontal solid line in each plot indicates the 5% significance level. The study rejects the null hypothesis of the CD to GSECI except for CAR, CLASL, CLATA, NPL, ROA, and ROE with GSECI. This is an indication that despite the observed relationships between the study's variables, it is changes in the CD that are found to directly influence the behaviour and performance of the GSECI across different quantiles. That is changes in CD can provide valuable information or insights about the future behaviour or performance of the GSECI across the various economic conditions.

Furthermore, except for CLASL, CLATA, NPL, ROA, and ROE with GSEFSI, the study rejects the null hypothesis of CAR to GSEFSI and CD to GSEFSI. This suggests that despite the observed relationships between the study's variables, it is the changes in CAR and CD that are found to directly influence the behaviour and performance of the GSEFSI across different quantiles. Thus, changes or fluctuations in CAR and CD can provide valuable information or insights about the future behaviour or performance of the GSEFSI across various economic conditions. CAR and CD could be indicative of the overall financial health and risk exposure of banks, which, in turn, can influence investor sentiment and market dynamics related to financial stocks.

Chapter Summary

The chapter presented a descriptive analysis of the banking sector's financial soundness and stock returns in Ghana. The graphical representation of the data series indicated the volatility and instability observed within the financial sector of Ghana. The descriptive analysis further divulged that on

average, the BoGCIEA has a stronger economic performance and that the average profitability of assets within the Ghanaian financial sector, as measured by ROA, is relatively low from 2011 to 2022. The descriptive statistics additionally showed the unpredictability and randomness associated with the GSE. The chapter proceeded to the correlation matrix, which indicated that an increase in the performance of GSEFI corresponds with an increase in the performance of GSECI.

The chapter further discussed the regression results. The OLS results revealed that the banking sector financial soundness indicators and the control variables had both positive and negative effects on the performance of the GSECI and the GSEFSI. Subsequently, the chapter discussed the effects across different quantiles. The results showed that the banking sector financial soundness indicators and the control variables have measurable effects on the performance of both the GSECI and the GSEFSI across all quantiles. The study finally employed conditional causality in quantile to establish the forecasting abilities of the banking sector's financial soundness on the GSECI and the GSEFSI. The significance and robustness of the findings obtained from the quantile regression approach were supported because causality was proven across various quantiles.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

This chapter outlines the main findings for conducting the entire study. This is followed by a summary, conclusions, recommendations, and suggestions for further studies. However, chapter one emphasized the relevance of the banking sector's financial soundness and stock returns to the Ghanaian economy and the integral role they play in demonstrating commitment towards sustainable development goals. This is due to the movement of international capital flows and the instability in the financial sector of Ghana. Precisely, the inconsistencies in the BSFSIs and volatility within the GSE.

The empirical review grounded on the study's objectives highlighted that there is scant literature on banking sector financial soundness and stock returns in aggregate or macro terms. Moreover, previous researchers did not account for the multifacetedness of the relationship. However, this research employed quantile regression and conditional causality in quantile to establish the associations between banking sector financial soundness and stock returns while accounting for inflation rate and BoGCIEA.

The positivist paradigm, quantitative approach, and explanatory design guided the study. As a result, 145 observations from January 2011 to December 2022 were examined. This period was selected due to the consistent availability of data. Also, the study established two foundational models. The first model specification examined the effect of banking sector financial soundness across the conditional distribution of stock returns. The second

model specification established the conditional causality between the banking sector's financial soundness and stock returns.

Summary of Key Findings

The first objective of the study examine the relationship between the financial soundness of the banking sector and stock returns. The relationship was examined across quantiles. The banking sector's financial soundness was found to have both positive and or negative effects on the quantile distributions of GSECI and GSEFSI depending on the measure for the financial soundness of the banking sector. CAR, CLATA, and CD had positive effects on the GSECI and GSEFSI, whereas CLASL had negative effects. NPL, ROA, and ROE showed mixed effects on the GSECI and GSEFSI.

The control variables (inflation and BoGCIEA) also had negative effects on the GSECI and the GSEFSI. These effects are established across the conventional levels of significance.

The second objective assessed the conditional causality between the financial soundness of the banking sector and stock returns.

The findings revealed changes in CAR to have forecasting ability on the performance and behaviour of the GSEFSI and changes in CD to have forecasting ability on the performance and behaviour of both the GSECI and GSEFSI.

Conclusion

From the first objective, we conclude from the findings that BSFSIs play vital roles in the performance of the GSE. This is because higher capital adequacy, efficient asset utilisation, and increased credit to deposits are

associated with better performance of the GSE, while NPL, ROA, and ROE affect GSE performance dependent on prevailing economic conditions.

From the second objective, the study concludes from the findings that, capital adequacy is a key indicator of the performance of the GSEFSI, and trends in the Credit to Deposit are important predictors for the performance of both the GSECI and the GSEFSI.

Recommendations

The following recommendations are given dependent on the study's findings and in correspondence with the study's objectives.

Concerning objective one, it is recommended that regulators and policymakers enhance CAR, CLATA, and CD to positively impact stock returns and also address the negative effect of CLASL through improved lending practices and risk management. Additionally, policies should be implemented to control inflation and boost economic activity to mitigate their negative impact on stock returns. Finally, regulators and policymakers should develop dynamic strategies by continuously monitoring financial indicators to adjust to changing economic conditions and improve market confidence.

From objective two, it is recommended that; CAR and CD should be regularly tracked and analyzed to forecast stock market performance. Also, regulatory and monetary policies should be aligned to strengthen CAR and boost CD. Lastly, CAR and CD should be included in data analytics and forecasting models to enhance strategic decision-making.

Suggestions for Further Research

To start with, further studies can build on this study by looking at the banking sector's financial soundness and stock returns in the context of other

emerging countries and their related stock markets. Additionally, subsequent research could consider the financial soundness of other institutions and markets such as non-bank financial institutions, the corporate sector, and the real estate market as they also play relevance in assessing vulnerabilities in a financial system. Finally, further studies could use alternative analytical techniques distinct from those utilised in this current study. This will unveil the additional possible associations that may be embedded in the topic under investigation.

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APPENDIX 1

GSECI	GSEFSI	CAR	CLASL	CLATA	CD	NPL	ROA	ROE	Inflation	BogCIEA(Real)
688.137	685.868	19.13	32.87	25.33	67.66	17.60	3.80	20.44	14.80	281.66
714.622	685.868	18.48	31.21	24.30	65.34	17.19	2.71	13.06	9.08	279.95
696.576	685.868	18.54	33.86	25.94	61.19	16.56	3.05	15.52	9.16	258.82
705.398	689.017	18.25	34.82	27.03	60.46	16.11	3.52	17.76	9.13	299.69
726.515	721.603	18.11	34.60	27.06	55.81	17.54	3.57	18.13	9.02	297.13
772.663	761.639	17.66	31.94	25.08	56.25	17.22	3.81	18.86	8.90	291.95
788.690	762.393	17.48	31.95	25.20	56.87	16.37	3.54	18.50	8.59	307.35
776.451	740.257	17.00	32.55	25.61	57.78	16.39	3.47	18.11	8.39	301.67
756.804	717.573	16.94	31.98	25.07	58.30	15.97	3.52	17.66	8.41	315.05
716.140	633.858	17.00	34.61	27.04	58.67	15.68	3.42	17.69	8.40	322.07
647.018	579.365	17.07	36.08	28.75	56.99	15.25	3.66	19.19	8.56	314.90
628.948	567.694	16.49	35.84	28.47	58.00	14.69	3.58	18.89	8.55	316.23
611.742	543.657	17.41	35.26	27.83	58.49	14.15	3.86	19.74	8.58	322.84
585.040	520.159	17.41	33.39	26.12	60.67	14.15	5.30	29.14	8.73	445.26
605.709	524.033	17.42	34.34	26.71	61.56	13.68	4.32	23.98	8.64	448.68
604.906	526.143	17.27	30.41	23.83	63.90	13.07	4.34	24.22	8.78	464.89
588.635	516.164	16.77	33.03	26.11	61.17	14.06	4.21	23.16	9.11	443.47
547.398	471.818	14.91	32.13	25.35	62.06	13.45	4.28	24.67	9.34	471.20
550.571	473.885	15.54	33.55	26.52	61.97	13.20	4.43	26.92	9.44	462.39
534.037	450.827	15.52	31.15	24.41	66.33	13.44	4.56	26.70	9.54	462.54
533.406	447.860	15.65	29.78	23.30	68.96	13.19	4.67	27.32	9.46	465.43

551.098	464.682	16.30	31.05	24.19	70.82	13.12	4.63	26.54	9.43	454.80
593.745	503.710	17.07	31.28	24.35	69.85	13.25	4.69	26.00	9.24	484.11
601.135	504.304	17.54	31.59	24.69	67.29	13.13	4.76	26.04	9.31	485.47
636.608	543.255	18.56	30.67	24.13	66.50	13.20	4.85	25.76	8.84	473.76
668.694	577.246	18.71	28.28	21.97	69.12	13.28	6.48	32.23	10.09	486.03
775.606	667.553	18.20	29.59	22.85	69.62	13.50	6.24	31.15	10.40	429.56
894.233	796.131	17.80	30.37	23.65	68.23	13.71	5.33	25.90	10.78	457.98
915.272	812.341	18.09	30.10	23.41	67.33	13.28	5.59	26.76	10.87	478.60
943.511	844.295	18.09	28.73	22.09	72.32	13.44	5.50	26.98	11.02	490.26
945.686	797.465	17.55	27.65	21.44	74.72	12.82	5.60	28.08	11.63	468.83
971.814	843.680	18.59	26.30	20.41	75.47	12.91	5.49	27.66	11.79	472.42
996.519	864.044	18.33	26.75	20.68	75.72	12.82	5.74	28.52	11.45	494.33
1,016.115	852.053	18.25	29.48	22.64	75.03	12.52	5.83	29.10	11.95	489.70
1,036.696	855.022	18.32	27.20	20.96	73.50	12.45	5.99	29.65	13.09	506.72
1,020.175	852.321	18.31	26.15	20.06	72.62	12.75	5.99	29.47	13.22	492.62
992.436	826.327	18.45	28.18	21.71	72.98	12.00	6.22	31.07	13.50	487.83
940.780	801.794	18.74	25.88	20.08	73.57	12.65	5.75	27.15	13.80	503.82
959.479	857.357	17.49	28.32	21.78	73.52	12.73	6.02	29.39	14.03	475.14
890.425	780.769	17.65	28.13	21.81	74.76	12.41	6.18	30.65	14.52	503.48
807.212	684.355	18.10	32.29	24.69	78.51	12.45	6.12	30.82	14.69	490.05
801.909	694.817	16.67	33.18	25.39	79.72	12.83	5.94	29.89	14.84	530.64
790.705	712.433	16.14	33.31	25.72	80.59	12.77	6.13	30.83	14.99	511.39
758.265	701.694	16.19	33.45	25.55	80.41	12.30	6.28	31.38	15.32	525.03
702.193	695.280	16.63	34.31	26.19	83.82	12.21	6.62	32.48	15.90	509.43
700.491	695.280	17.00	34.11	25.80	84.92	12.09	6.85	34.01	16.47	503.43

703.887	665.730	17.05	34.92	26.62	80.80	12.15	6.51	33.28	16.90	508.73
709.421	683.639	17.71	34.36	26.22	80.55	11.96	6.43	32.13	17.05	513.89
706.558	722.985	17.93	34.84	26.81	74.33	11.27	6.44	32.28	16.99	523.79
670.952	722.985	17.86	34.25	25.88	78.01	11.47	6.92	32.21	16.44	510.53
626.838	595.308	17.49	35.31	26.63	75.70	11.43	6.02	27.51	16.50	479.21
592.541	595.308	16.89	34.54	25.94	79.15	11.42	6.30	29.30	16.64	514.03
590.437	552.228	17.00	34.79	26.25	78.68	11.55	5.71	26.72	16.76	527.47
591.012	646.531	16.20	35.02	26.55	78.67	11.19	5.86	28.71	16.91	523.46
542.438	552.228	16.18	34.22	26.29	80.33	11.19	5.62	29.08	17.08	517.71
634.475	646.531	17.65	32.65	24.50	80.25	13.09	5.59	27.34	17.94	508.88
549.252	545.196	16.78	35.26	26.65	82.22	13.02	5.69	28.05	17.30	528.66
539.425	518.949	17.60	35.29	26.47	81.37	13.49	5.41	26.65	17.36	520.28
531.249	515.511	17.43	34.60	26.26	78.52	14.07	5.35	26.46	17.38	549.88
520.410	503.309	17.56	34.52	26.43	76.08	14.12	4.91	24.15	17.58	544.15
525.668	508.580	17.81	34.23	26.43	72.97	14.67	4.64	22.15	17.70	549.26
522.668	506.353	17.88	32.14	24.42	74.99	14.60	5.20	23.78	19.00	539.01
508.549	492.152	18.08	32.84	24.75	75.34	15.62	4.60	20.72	18.50	538.57
498.376	475.415	17.56	34.52	26.06	74.67	16.22	5.02	23.45	19.20	535.83
483.191	453.747	17.52	32.88	25.11	74.95	18.57	4.70	21.95	18.70	521.01
457.713	430.323	16.68	32.43	25.09	73.39	19.30	4.60	21.78	18.90	562.58
455.304	425.706	16.18	31.83	24.37	77.92	18.77	4.87	22.86	18.40	550.23
455.328	425.581	16.68	32.83	25.23	76.01	19.07	4.83	23.54	16.70	551.40
457.563	433.914	16.53	32.22	24.95	76.64	18.59	4.56	21.73	16.90	561.15
446.909	423.684	17.01	32.64	25.07	76.20	19.12	4.81	20.78	17.20	540.98
436.006	405.782	17.07	31.60	24.42	72.57	18.99	4.34	20.21	15.80	525.02

390.840	346.726	17.08	33.62	25.78	71.81	18.82	4.14	19.44	15.50	539.10
402.145	367.937	17.75	35.14	27.21	68.54	17.29	3.79	18.01	15.40	565.65
415.916	389.939	17.77	33.93	26.53	67.76	18.03	4.66	24.25	13.30	577.16
414.087	390.932	18.47	32.85	25.45	67.62	17.73	4.02	19.56	13.20	542.88
431.990	408.899	18.07	34.57	26.82	68.06	20.25	4.41	21.23	12.80	566.41
452.899	429.522	17.36	33.30	25.63	68.09	19.82	4.03	19.29	13.00	569.85
447.939	419.015	15.98	32.96	25.55	68.59	21.04	3.76	17.87	12.60	584.85
450.285	418.272	14.83	32.50	25.39	68.85	21.18	3.70	17.72	12.10	567.08
515.918	475.354	14.75	36.67	28.17	66.85	21.53	3.70	18.11	11.90	576.89
543.031	500.414	15.91	33.43	25.86	69.46	21.87	3.16	14.94	12.30	596.06
529.331	465.026	14.53	32.55	25.21	71.00	22.22	2.61	11.39	12.20	564.11
539.582	465.644	15.00	32.55	25.10	68.71	21.59	2.99	14.41	11.60	568.68
571.522	505.029	14.85	32.15	24.86	65.44	22.91	3.06	14.59	11.70	597.08
584.222	523.271	18.55	33.33	25.96	64.99	21.59	3.31	16.56	11.80	607.07
695.520	640.576	16.66	33.07	25.32	65.25	21.04	2.28	7.32	10.35	595.12
755.245	704.085	19.21	32.65	24.92	59.70	21.59	3.98	18.96	10.58	573.72
764.429	693.023	19.30	31.95	24.29	59.61	22.58	3.69	17.99	10.36	591.00
791.653	726.167	18.92	30.70	23.55	60.17	23.45	3.57	17.27	9.55	590.65
716.203	643.427	18.95	31.45	24.02	60.55	22.77	3.50	17.19	9.81	605.59
636.627	571.012	19.31	30.53	23.44	62.60	22.56	3.51	16.80	9.97	590.89
624.415	566.363	18.91	35.27	27.13	61.28	21.07	3.47	17.15	9.63	599.92
613.357	569.672	19.08	32.94	25.58	49.86	21.31	3.33	16.91	9.86	588.87
628.142	549.914	20.22	32.32	24.93	51.72	20.03	3.28	17.13	9.79	580.10
593.912	482.265	20.04	31.02	23.71	52.65	20.10	3.29	17.57	9.52	588.39
547.137	458.084	19.66	30.36	23.33	52.56	19.28	3.14	16.13	9.34	609.38

533.656	446.834	19.27	33.97	26.03	53.44	18.19	3.34	18.18	9.43	610.40
505.767	430.544	21.78	31.14	23.86	50.42	18.39	4.75	21.83	9.01	614.60
479.023	406.931	21.71	30.60	23.46	50.70	18.18	4.20	20.13	9.17	589.78
482.848	423.986	20.96	29.68	22.97	51.30	18.76	4.40	21.12	9.28	604.90
460.746	397.826	21.37	28.91	22.50	51.68	18.94	4.12	18.87	9.47	599.28
473.181	411.496	19.35	30.47	23.55	52.29	18.84	4.36	21.49	9.41	620.64
455.376	397.412	19.12	30.56	23.92	51.17	18.05	4.37	21.15	9.12	596.78
446.361	393.666	19.32	30.26	23.42	50.81	17.88	4.01	17.34	9.44	612.59
436.210	378.636	19.67	30.10	23.31	51.11	17.75	4.32	20.88	7.80	608.86
414.738	356.321	19.64	31.91	24.61	50.82	17.27	4.26	20.50	7.60	604.51
402.957	338.852	23.89	30.18	23.27	52.72	17.26	4.32	20.70	7.70	634.99
386.924	323.739	19.72	28.59	22.17	53.30	16.66	4.28	20.44	8.20	629.95
407.892	364.973	18.28	30.47	23.97	54.12	14.27	4.15	19.94	7.90	695.57
404.633	366.279	18.10	28.82	22.41	56.35	13.57	5.01	26.61	7.80	635.26
417.740	371.029	20.20	31.32	24.17	55.25	13.79	4.87	25.46	7.80	631.95
396.819	353.329	21.20	31.91	23.89	53.32	14.49	4.30	21.20	7.80	593.56
375.065	340.370	20.90	30.12	22.47	53.02	14.96	3.87	18.88	10.60	536.51
345.361	327.936	21.30	30.62	22.72	51.28	15.21	3.86	19.11	11.30	557.16
335.233	304.379	21.20	29.18	21.71	49.94	15.65	4.13	20.58	11.20	621.48
330.675	304.811	21.50	30.10	22.38	48.82	16.08	4.22	21.21	11.40	636.70
324.829	296.827	20.90	28.99	20.91	49.08	15.46	1.61	7.95	10.50	648.77
325.558	293.831	20.30	29.60	22.29	46.97	15.77	4.22	21.00	10.40	669.54
321.764	289.184	20.00	27.04	20.53	47.27	15.32	4.24	21.23	10.10	704.20
318.290	284.011	20.02	25.39	19.12	47.03	15.37	4.24	20.95	9.80	704.85
337.070	309.496	19.83	27.76	21.15	46.02	14.82	4.36	21.40	10.40	753.58

351.906	323.146	20.50	26.20	19.80	46.06	14.70	4.90	25.60	9.90	723.61
383.609	326.509	20.20	26.50	19.90	45.74	15.30	4.40	22.10	10.30	710.13
386.344	322.218	21.10	26.90	20.30	44.65	15.50	4.70	22.40	10.30	752.50
446.853	327.461	21.80	24.90	18.60	45.65	15.50	4.60	21.10	8.50	748.07
421.260	331.095	21.60	25.50	19.10	45.10	16.80	4.50	20.90	7.50	741.88
458.763	324.751	20.70	27.50	20.70	43.10	17.00	4.70	21.20	7.80	747.06
468.411	325.826	20.60	27.80	20.90	43.21	17.00	4.60	21.30	9.00	764.05
470.012	329.680	20.70	24.70	18.60	43.80	17.30	4.60	21.00	9.70	746.12
486.728	350.340	19.90	25.30	19.10	43.97	16.80	4.60	21.10	10.60	744.17
485.402	352.848	19.80	24.60	18.90	43.92	16.40	4.40	19.80	11.00	739.09
484.479	353.441	19.70	24.40	18.70	43.42	16.00	4.40	21.10	12.20	776.95
464.418	358.277	19.60	25.90	20.00	44.42	15.20	4.50	20.60	12.60	791.02
459.327	353.930	19.32	26.55	20.40	44.48	14.22	4.52	22.22	13.90	753.64
408.528	321.035	19.56	24.19	18.57	45.76	14.40	4.27	21.46	15.70	741.29
385.654	305.807	21.31	27.59	21.25	46.06	14.42	4.68	22.13	19.40	787.35
378.359	310.665	21.33	28.22	21.70	47.35	14.30	4.68	22.30	23.40	767.12
357.608	306.906	20.62	28.65	22.10	48.53	14.40	4.65	22.37	27.60	754.67
352.048	301.082	19.35	30.18	23.36	48.25	14.06	4.59	21.94	29.80	759.31
330.906	276.350	18.57	30.74	23.87	47.41	14.20	4.64	22.67	31.70	767.57
304.766	252.650	17.80	31.08	23.93	48.36	14.30	4.68	23.02	33.90	737.77
256.134	215.528	16.31	31.54	24.44	48.32	14.05	4.50	21.91	37.20	735.16
189.129	159.117	14.18	34.41	27.22	47.20	13.96	4.02	20.23	40.40	731.99
187.973	158.484	14.74	35.14	27.92	46.84	14.08	4.04	20.67	50.30	729.09
284.971	239.341	16.56	35.26	27.73	44.33	14.79	3.08	14.58	54.10	729.09