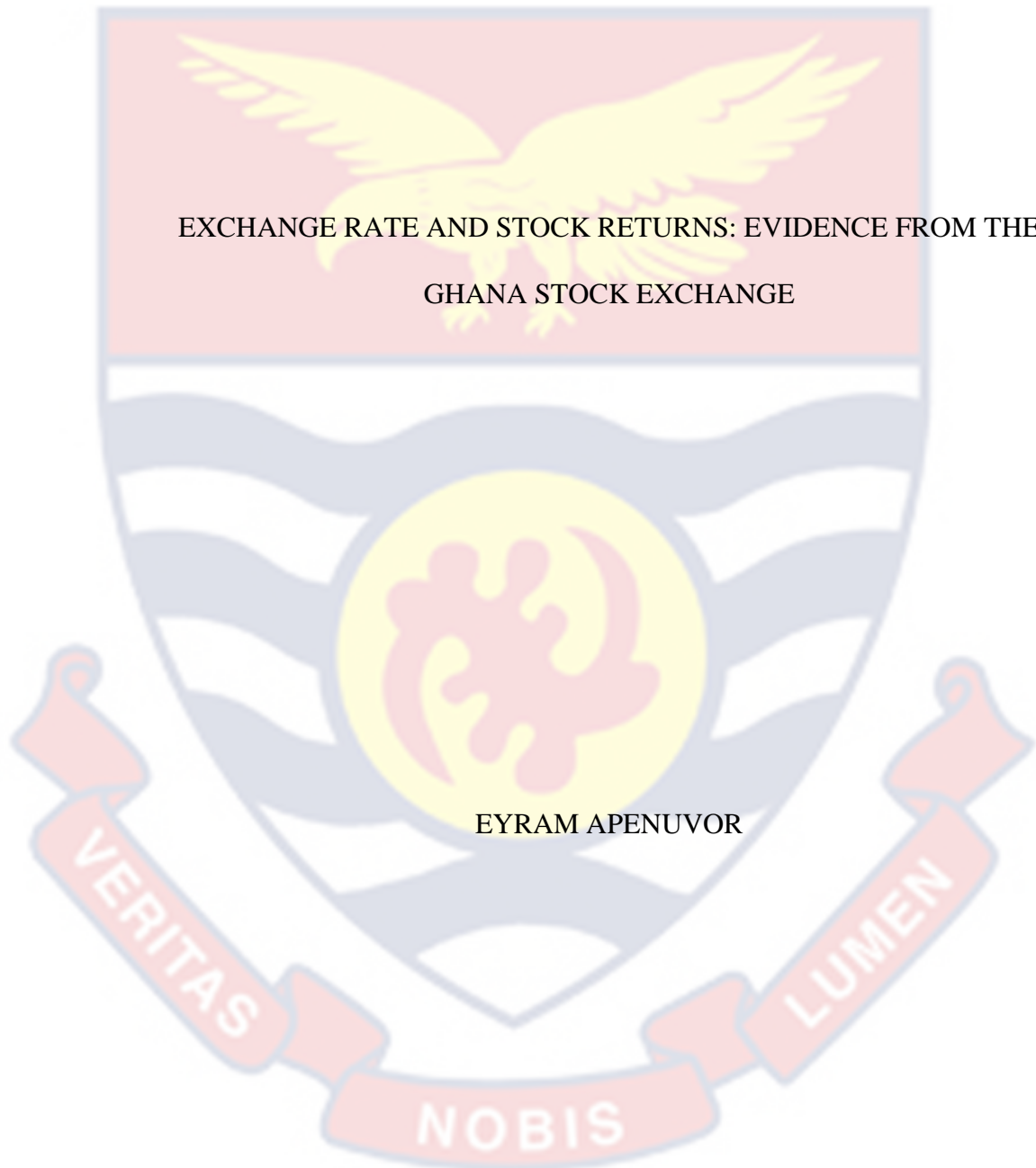UNIVERSITY OF CAPE COAST

EXCHANGE RATE AND STOCK RETURNS: EVIDENCE FROM THE

GHANA STOCK EXCHANGE

EYRAM APENUVOR

2023

UNIVERSITY OF CAPE COAST

EXCHANGE RATE AND STOCK RETURNS: EVIDENCE FROM THE

GHANA STOCK EXCHANGE

BY

EYRAM APENUVOR

Thesis submitted to the Department of Finance of the School of Business,

College of Humanities and Legal Studies, University of Cape Coast, in the

partial fulfillment of the requirement for the award of Master of Commerce in

Finance

JULY 2023

## DECLARATION

**Candidates' 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

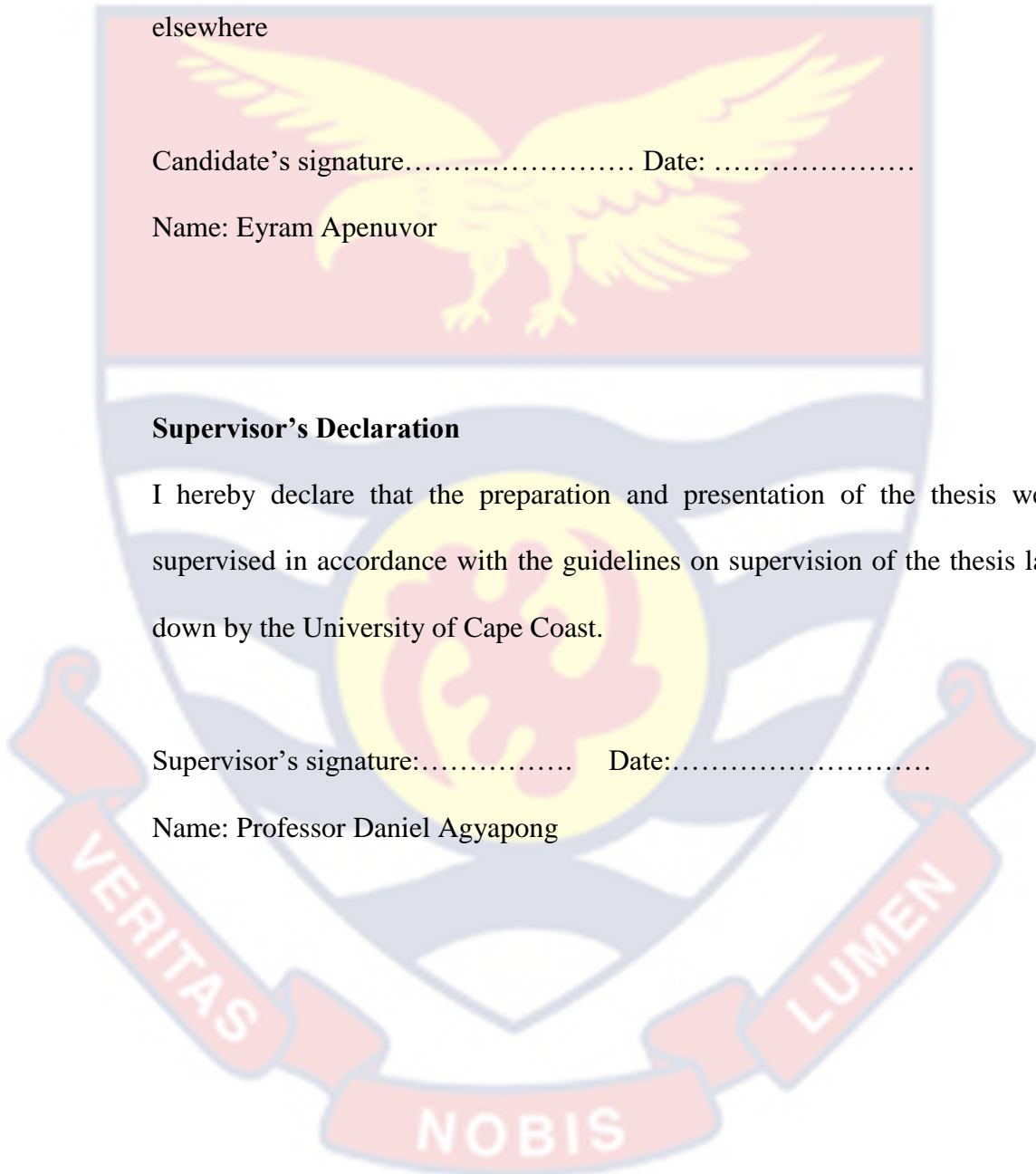Candidate's signature…………………… Date: …………………

Name: Eyram Apenuvor

**Supervisor's Declaration**

I hereby declare that the preparation and presentation of the thesis were

supervised in accordance with the guidelines on supervision of the thesis laid

down by the University of Cape Coast.

Supervisor's signature:…………….    Date:………………………

Name: Professor Daniel Agyapong

## ABSTRACT

The main objective of every investor is to amass wealth. This objective can be limited by several risk factors, among which the exchange rate plays a key role in the investor's decision-making. This has been a source of major concern to all the stakeholders in the capital market. Thus, the study set out to investigate the link between the exchange rate and stock returns for seven sectors in Ghana. The study employed monthly data observations of the seven sectoral indexes on the Ghana Stock Exchange and the USD-Cedi rate for the period January 2014 to April 2022 which were obtained from Ghana Stock Exchange and Bank of Ghana. Analyses of the study were conducted using the bivariate wavelet coherency and quantile regression as opposed to the traditional Pearson-correlation and least square as they do not reveal hidden relationships. The results from the study indicate that there exists a phase-difference co-movement between the exchange rate and stock returns with both assets driving each other; and that diversification possibilities exist in the short term rather than in the medium and long term. The quantile regression estimates also revealed that the exchange rate has a significant and varying positive effect on the returns of the finance and insurance sectors in normal and bullish markets. Based on these findings, the study recommends that market participant should take into account the time-varying nature of the relationship between the exchange rate and stock returns in their investment decision-making. Also, it is recommended that in times when the market is expanding, economic policies formulated by policy makers must be geared towards developing the finance and insurance sectors so as to occasion the growth in other sectors.

**KEY WORDS**

Exchange rate

Sectoral Stock returns

Ghana Stock Exchange

Bivariate wavelet coherency
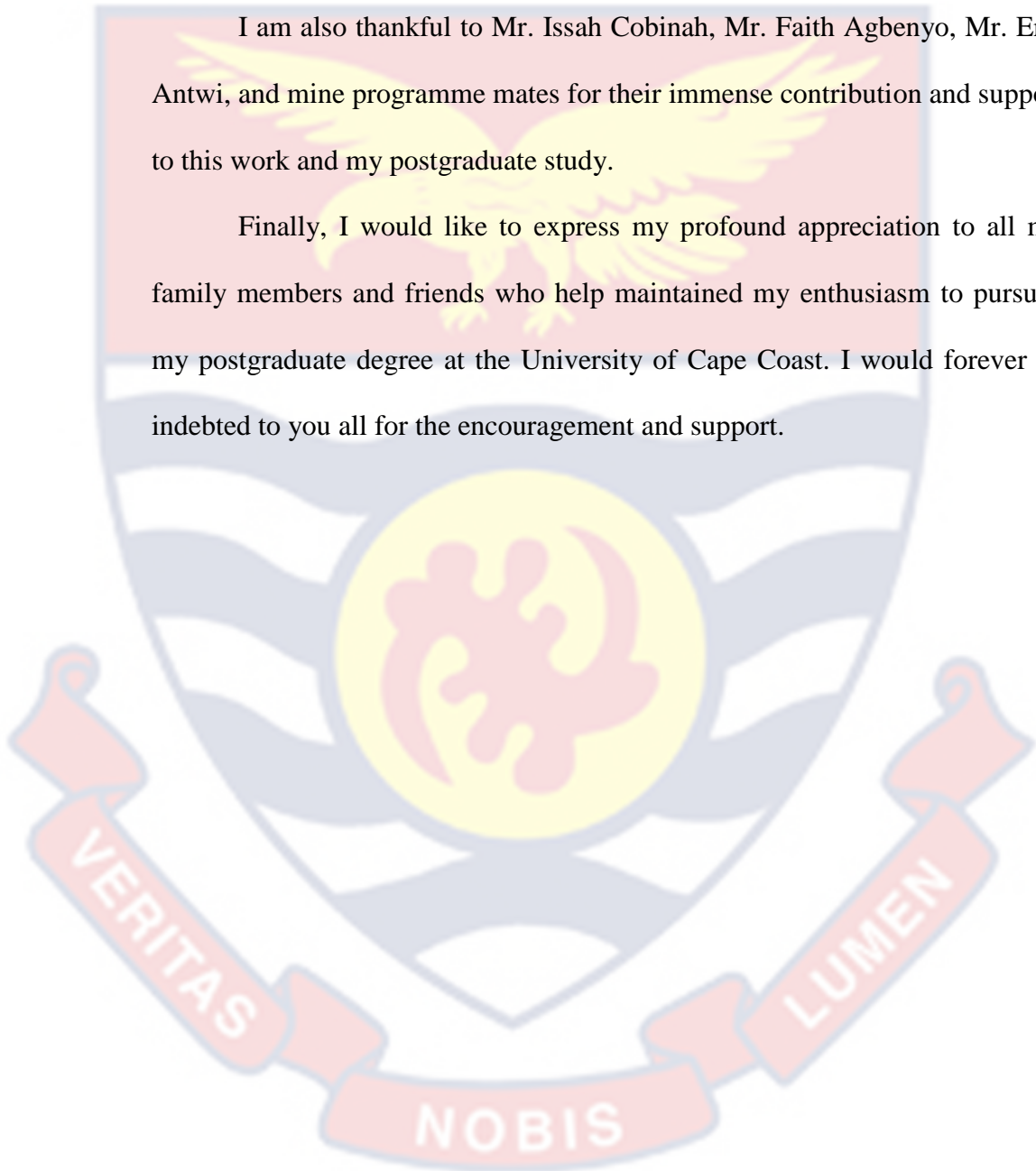
Quantile regression

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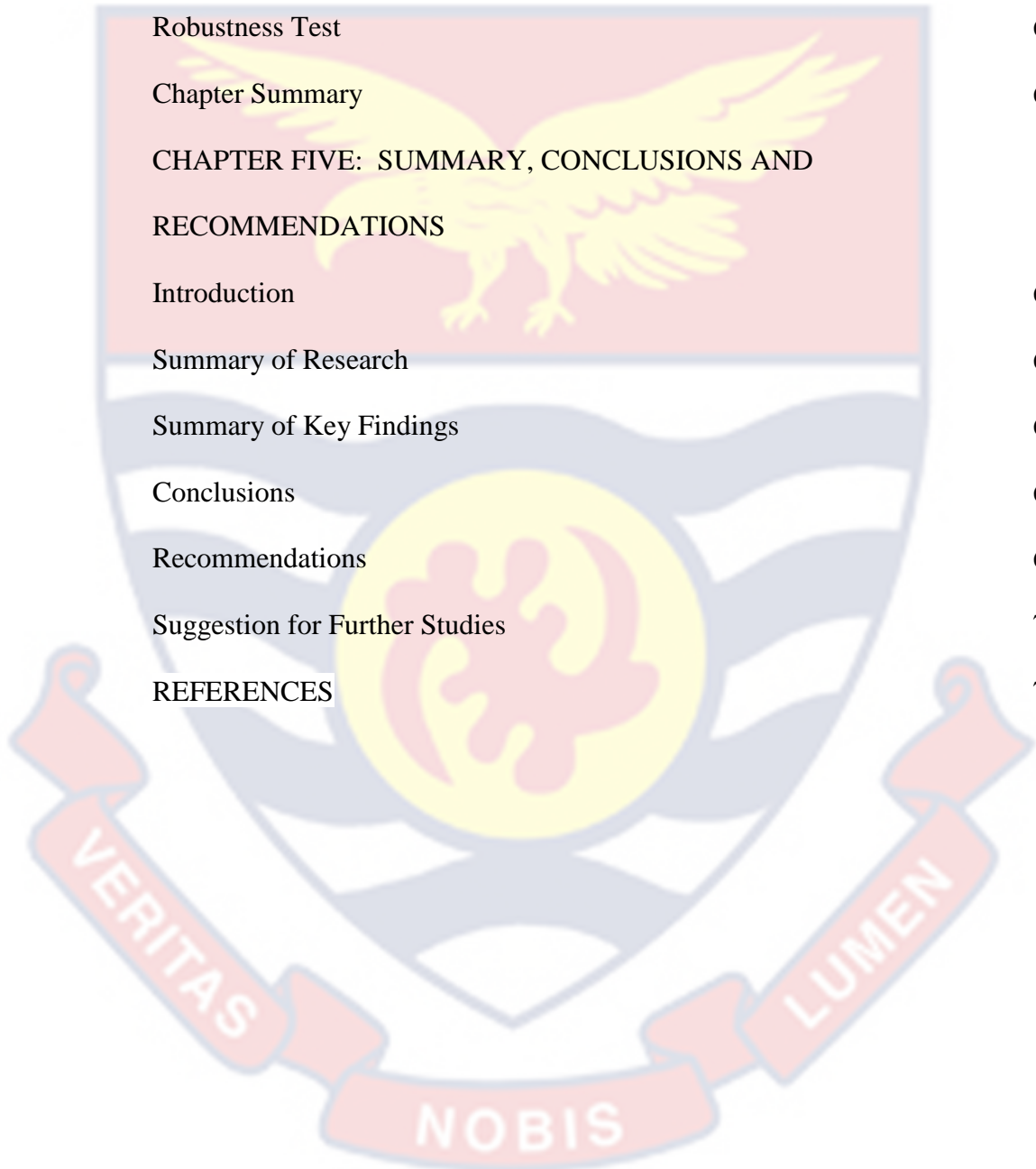
# DEDICATION

To my family.

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## LIST OF ACRONYMS

| | |
|---|---|
| ADF | Augmented Dickey Fuller |
| ARDL | Auto Regressive Distributed Lag |
| ARCH | Autoregressive Conditional Heteroskedasticity |
| ASI | All-Share Index |
| BRIC | Brazil, Russia, India, and China |
| BRICS | Brazil, Russia, India, China, and South Africa |
| CAPM | Capital Asset Pricing Model |
| CI | Composite Index |
| CBG | Central Bank of Ghana |
| CPI | Consumer Price Index |
| COVID-19 | Coronavirus Disease of 2019 |
| EMH | Efficient Market Hypothesis |
| ETF | Exchange Traded Funds |
| EXR | Exchange Rate |
| FSI | Financial Stock Index |
| GARCH | Generalised Autoregressive Conditional Heteroskedasticity |
| GES | Ghana Stock Exchange |
| GHS | Ghana Cedis |
| GDP | Gross Domestic Product |
| HMH | Heterogenous Market Hypothesis |
| ICT | Information Communication Technology |
| IMF | International Monetary Fund |
| INF | Inflation Rate |

| | |
|---|---|
| IR | Interest Rate |
| MNCS | Multinational Corporations |
| NARDL | Non-linear Auto Regressive Distributed Lag |
| OLS | Ordinary Least Squares |
| PNDC | Provisional National Defence Council |
| SDGs | Sustainable Development Goals |
| USD | United State Dollars |
| VAR | Vector Autoregressive |
| VECM | Vector Error Correction Model |

# CHAPTER ONE

# INTRODUCTION

## Introduction

In both industrialised and developing economies, stock markets are crucial for the mobilisation of funds and have the potential to foster both economic and social growth (Onyango, 2018), of which Ghana is no exception. Additionally, given that stock returns reflect information on macroeconomic policies such as exchange rate, thus it must be incorporated in investment decision making (Owusu Junior, Boafo, & Awuye, 2018). The stock market may not provide complete information based on inefficiencies in the markets, but investors nevertheless act in an anticipatory manner by continuously surveying the economy for new information that may possibly influence the return on their investment choices at different time horizons and market situations, as they have different needs and preferences (Dar, Shah, Banja & Samantaraya, 2014).

## Background to the Study

Ghana Stock Exchange (GSE) serves as an intermediary between lenders (investors) and borrowers (firms) on the stock market in Ghana (Shinkeva, 2020). According to Kwofie and Ansah (2018), the concept of the establishment of the Ghana Stock Exchange (GSE) in the 1990s was a result of the recommendations made from the economic reforms implemented in the 1980s. The effectiveness of the Ghanaian governance structure has not only promoted substantial transfer of funds from the international market but has also deepened investors' confidence in the stock market (Korley & Giouvris, 2021).

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The increase in confidence of investors has led to an upsurge in total market capitalisation from GHS 20.2 billion as of December 31, 2010 to over GHS 60 billion in 2022 (GSE Reports, 2022). Based on the astronomical increase in market capitalisation, the Ghanaian stock market was adjudged the best performing stock market in Sub-Sarahan Africa in 2013, and the most innovative market in Africa in 2018 (Yonga, 2014; GSE, 2018). Aside these achievements, GSE was labeled the second-best performing stock exchange in Africa in 2021, with investors gaining 38.59% and 43.66% in dollars and cedis, respectively. In spite of all these achievements, the overall performance of the stock market is relatively unstable (Cudjoe, 2021) as it swings between GHS 40 billion and GHS 66 billion (GSE Reports, 2022) and only account for 14% of nominal GDP in 2021 (CEIC Data, 2021).

The combined effect of globalisation, economic integration, and trade liberalisation has not only made the Ghanaian stock market more attractive, and inclusive; But also, more defenseless than ever before due to its tendency effect it has on exchange rate which consequently affects managerial decisions with regards its profitability (Cuestas & Tang, 2017). Over the past years, Ghana's currency the cedi has experienced extreme volatility, particularly in recent times where activities of globalisation, economic integration, and trade liberalisation have intensified (Tweneboah, Junior, & Oseifuah, 2019). In 1983, the fixed exchange rate regime was abolished and replaced with the managed-floating system (Ofori-Abebrese, Baidoo, & Osei, 2019). However, this was not the best as there needed to be constant devaluation of the cedi in order to keep it competitive (Asare-Kyere, 2019).

Thus, the institution of Financial Sector Adjustment Programme (FINSAP), which was an element of Economic Recovery Programme (ERP) paved the way for the adoption of the flexible exchange rate regime in 1992 (Alagidede & Ibrahim, 2017). The main aim of the adoption was to promote stability in the currency through the use of demand and supply forces in the currency market, but sadly, this objective has not been achieved (Onyango, 2018). Hence, in 2007, the cedi was redenominated to make it more stable and competitive (Gatsi, Appiah, & Wesseh Jr, 2016). However, this mission was not sustainable as in 2013 to early 2014, the cedi witnessed crisis for which capital control measures were adopted to reduce the rate of international transactions (Boako, Omane-Adjepong, & Frimpong, 2016).

Similarly, since the beginning to October of 2022 the cedi has lost 45.11%, making it the worst performing currency in the world (Premium Times, 2022); corollary informing government's decision to inject $2 billion in the bid of stablising the cedi (Adabor & Buabeng, 2022). The excessive loss in value can be traced to the excessive importation of goods and services that could have been easily produced in Ghana (Boateng, 2019), which turned out to have a negative impact on the current account balance positions of the country (Makori, 2017). Barnes and Tawiah (2015) contend that, aside the excessive importation, economic activities such as: consumption, agriculture, and money supply depict the trend exchange rates follows. The extreme movement in the exchange rate has adverse repercussions on both macroeconomic and microeconomic levels (Boako *et al*., 2016).

On the macroeconomic front, if exchange rate variation is not well managed, it could hamper the country's ability to achieve its long-term vision

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of promoting economic stability by 2057. At the microeconomic level, however, changes in exchange rates affect the cash flows of firms, thus having effects on their stock returns (Dar *et al*., 2014). This consequently affects the wealth of the investor (Shinkeva, 2020). According to Dahir *et al.* (2018), exchange rate has varying effects on firms regardless of their involvement in international trade. Exchange rate affects the profit of importing and exporting companies through their competitiveness in terms of trade and foreign currency current account balance (Ahmed, 2020).

Profits of multinational firms, on the other hand, are affected through transactional exposure, translational exposure, and operational or economic exposure (Jeon, Zheng, & Zhu, 2017). Arguably, one would say exchange rate has no impact on the profit of purely domestic firms' since they have no involvement in international trade; however, they are affected indirectly by movements in exchange rate through the pricing window (input and output), rivalry channel, and demand and supply channel (Onyango, 2018). The effect on these profits in turn feeds into the market capiatalisation of the sectors these firms belong to (Naseer, Khan, Popp, & Oláh, 2021). Thus, it could be said that exchange rate affects the firms' profitability, the returns of the various sectors, investor wealth, the sustainability of the stock market, and economic growth.

The ripple effect exchange rates have on the economy begs the question of the effectiveness of Central Bank of Ghana in managing exchange rate variations (Ofori-Abebrebese *et al*., 2019). The effect of exchange rate is more severe in Ghana due to the non-existence of a derivative market, which would have provided derivative instruments that could have been used to

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hedge against the firm's credit risk and the investor's unsystematic risk (Kwofie *et al*., 2018). Also, the non-existence of a derivatives market has contributed to the unconventional manner in which market participants' trade in an attempt to reduce their risk, thereby causing variation in the relationship between the two variables (Ali, Mangla, Rehman, Xue, Naseem, M. A., & Ahmad, 2020). The non-linear pattern observed about the traders in the Ghanaian stock market can be attributed to their varying needs and preferences (Owusu *et al*., 2018).

Thus, the frequency or time scale that would suit their needs is determined by their investment requirements and strategies (Živkov, Balaban, & Djurakovi, 2018). Aside their needs and preferences indicating the scales to trade, the reaction of these market participants could be based on the information accessible to them (Boako *et al*., 2016). Some scholars have argued that adverse information or crisis in one market, such as the global financial crisis or the European debt crisis, could be easily emitted to other financial markets (especially the developing ones) since they are highly integrated (Gu, Zhu, & Wang, 2022; Dahir *et al.,* 2018); thereby having spillover effects in the currency markets, which consequentially affect the returns of the various sectors (Tweneboah, Junior, & Kumah, 2020).

However, Asafo-Adjei *et al.* (2020) have argued that the African stock market is segregated from the rest of the world, and thus adverse shocks in other markets are not observable in Africa, of which Ghana is no exception. Regardless, Ghana has had its fair share of series of events, such as the currency crisis from 2013 to early 2014 and again in 2022, as well as the commission of more oil fields in 2015, the financial sector cleans up in 2017

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and Coronavirus disease in 2020 (Boako *et al.*, 2016; Insaidoo, Arthur, Amoako, & Andoh, 2021). The combined effects of these events have contributed to the exchange rate being very volatile (Korley *et al*., 2021). This eventually influences firms' expected cash flows, therefore affecting the returns of the various sectors to which these firms belong (Dar *et al*., 2014).

**Statement of the Problem**

It is clear that exchange rate is of utmost importance to all market participants, particularly firms and investors, since it affects managerial decisions. The stock market serves as a platform where funds are exchanged between lenders and borrowers (Effiong & Bassey, 2019). Specifically, the Ghanaian stock market, just like any other emerging market, is dominated by foreign investors (Korley, *et al*., 2021). Therefore, an increase in exchange rate uncertainty has a devastating impact not only on stock markets but the economy at large (Boateng, 2019). The Ghanaian cedi has continuously lost value against its major trading counterparts since the adoption of the floating exchange rate regime (Buabin, 2016). The volatility in the currency markets poses high operational risk, also known as systematic risk (Insaidoo *et al*., 2021; Makori, 2017).

Overall, this high operational risk limits the expected future cash flows of a firm, which affects the growth prospects of the business (Hung, 2020). The decline in cash flows contributes to the decrease in stock returns of these firms, which largely affect the individual industries to which these firms belong (Naseer *et al*., 2021). The decrease in stock returns of these industries does not attract any new investors and serves as a disincentive for existing investors (Dar *et al*., 2021). This eventually causes the total collapse of the

stock market, which in the long run affects the ability of the firm and sector to expand (Dahir *et al*., 2018). This phenomenon turns out to affect the performance of targeted industry the firm belongs to (Naseer *et al.,* 2021). The policy makers are mainly worried because this phenomenon can hamper economic growth (Agyei, Bossman, Asiamah, & Adela, 2022).

For the period 2014 to 2022, stock prices seem to be relatively unstable as a result of domestic currency crisis witnessed in this period with 2022 being the worst form of currency crisis ever experienced (Adabor *et al*., 2022). Gokmenoglu *et al.* (2021) opined that extensive studies on the relationship between exchange rate and stock returns have been conducted in advanced markets with little emphasis placed on emerging markets.  However, Dar *et al.* (2014) maintained that emerging markets unlike advanced markets are highly inefficient thus the linkage between the two variables may differ. This has led spur of interest to find if the observations pertaining to the phenomenon in the emerging market differs from that of the developed markets (Agyei *et al.,* 2022; Korley *et al*., 2021; Mishra, 2016).

Although there has been extensive work done in Ghana, on the relationship between exchange rate and stock returns in the past.  In recent times however, there has been increase in the calls to examine the relationship between the variables (Asare-Kyere, 2021). This can be premised on Ghana's adoption of Sustainable Development Goals (SDGs) which stresses on economic growth through revenue moblisation (Cudjoe, 2021) of which the stock markets play integral role. Therefore, warranting the need to examine the relationship between exchange rate and stock returns as this variable tend to influence stock returns (Boateng, 2019). As it may hamper the achievement

of SDGs with reference to economic growth through the effect exchange rate has on stock returns (Boateng, 2019).

Results from earlier studies conducted in Ghana on the relation between exchange rate and stock returns indicated mixed and inconclusive findings. Some researchers assert there exist no relationship between the variables (Asare-Kyere, 2019; Gatsi *et al.,* 2016) while others argue either for a positive (Ofori-Abebrese *et al., 2019)* or negative relationship (Kwofie *et al.*, 2018; Boako *et al.*, 2016) between the said variables. Notwithstanding, these researchers focused on the causality among the variables or the effect of one on the other. All these studies were conducted using the all-share index or composite index which measures stock returns at the aggregate level or market level with exception of Owusu *et al.* (2018), Boako *et al.* (2016) who examined the finance sector in addition.

Adeniyi and Kumeka (2020) indicated that emerging markets are mainly dominated by unsophisticated retail and institutional investors who have the strength to invest in sectors that gives the high returns at minimum risk (Cuestas *et al.*, 2017). Measuring stock return at market level conceals how each sector respond to movement in exchange rate due to their unique strength and vulnerabilities (Mouna *et al.*, 2015). Studies have shown that investors react based on the information accessible to them (Ali *et al.*, 2020; Dar *et al.*, 2014) and also preferences and needs (Agyei *et al.*, 2022; Owusu *et al.*, 2018).

However, previous works considered the relationship using a conventional time domain (Asare-Kyere, 2019; Gatsi *et al.,* 2016; Ofori-Abebrese *et al., 2019;* Kwofie *et al.*, 2018) which does not capture the

investors strategies, assets allocation decisions, and investors sentiment except for Owusu *et al.* (2018) who incorporated the time horizon while Boako *et al.* (2016) observed the assets at the various market conditions. However, the sample period used for these studies was limited to 2016 which does not capture events such as the COVID-19 and currency crisis in 2022. Thus, the need for fresh evidence by incorporating the investors' sentiment, investment strategies, and portfolio diversification decisions in examining the relationship between exchange rate and stock returns.

In view of that, the study contributes to literature by given a comprehensive account on the relationship between exchange rate and sectoral returns for seven individual sectors, it is the highest so far to be incorporated in a single study in Ghana. The study also extends the work of Owusu *et al.* (2018) and Boako *et al.* (2016) by extending the sample used to 2022, which would account for the financial sector meltdown in 2017, COVID-19, and current currency crisis in 2022.

**Purpose of the Study**

The study investigated the connection between exchange rate and sectoral stock returns in Ghana.

**Research Objectives**

The specific objectives are to:

1. analyse the relationship between exchange rate and sectoral stock returns in Ghana at different time horizons.

2. examine the effect of exchange rate on sectoral stock returns in Ghana at the various market situations.

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**Research Hypotheses**

Based on the research objectives and literature, the following research hypotheses were formulated:

$H_1$**:** There is no co-movement between exchange rate and sectoral stock returns in Ghana at different time horizons.

$H_2$**:** Exchange rate has no significant effect on sectoral stock returns in Ghana at the various market situations.

**Significance of the Study**

The study contributes to investors' decision-making in risk diversification as it helps in the selection of the best portfolio. Also, the study assists managesr in implementing policies and strategies that would boost their performance. Lastly, it aids policy makers in the formulation of economic policies that in the long run promotes financial stability.

**Delimitation**

The study focused on changes in exchange rate and stock returns in Ghana. Specifically, it focused on the sectoral distribution available on the Ghana Stock Exchange (GSE). In spite of there being 11 sectoral groupings currently on the GSE, the study employed only seven sectors, namely: finance, insurance, distribution, manufacturing, mining, and agriculture. These sectors were chosen on the grounds of data accessibility. Also, the study considers USD/GHS rate as the measure for exchange rate as it is termed as the global reserve currency (Onyango, 2018).

**Limitations**

The Ghanaian market studied had missing data on stock returns for some of the months. However, this plight did not affect the findings of the

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research as the estimation method chosen for the analysis of data in the study deals with missing data and provides robust results.

**Definition of Terms**

**Stock Returns**

Stock returns are the gains awarded to an investor for a given investment. It can be in the form of dividend received or fluctuations in price of capital assets (Shinkeva, 2020). For purposes of this study, the study considered movement in stock prices as an all-inclusive measure of stock returns since it comprises of all information available to the investors (Adebowale & Akosile, 2018).

**Exchange Rate**

Exchange rate is the rate or the price at which a country's currency is traded for another (Makori, 2017). Exchange rate on its own does not pose any effect but rather the volatility or variation in exchange rate instead (Boateng, 2019). The variation in exchange rate refers to the up and down movement in the currency market (Owusu *et al*., 2018). This study based on the variation in exchange rate to make its argument.

**Organisation of Study**

The study was divided into five chapters. Chapter one covered the introduction, background to the study, statement of problem, purpose of the study, objective of the study, research hypothesis, delimitation, limitations, and organisits of the study. Chapter two gives detailed information on theoretical, empirical and conceptual review of literature on exchange rate volatility and stock returns. This chapter represents the summary of findings works conducted on the subject at hand and identifies the knowledge gap in

literature. Chapter three discusses the methods and data used in the study. The chapter under discussion outlines detailed econometric methods and empirical framework that were used in the study. Chapter four presents the findings from the statistical analysis. Lastly, chapter five presents' conclusions and recommendations arrived at in the study.

## CHAPTER TWO

## LITERATURE REVIEW

### Introduction

This study examines the linkage between exchange rates and stock returns. This chapter is mainly centered on the theoretical and empirical justifications for the study. Three theories were employed in the study, namely; the international trading effect theory, portfolio adjustment theory, and arbitrage pricing theory. In addition to this, the adaptive market hypothesis and the heterogeneous market hypothesis were employed. Also, this chapter presents a thorough analysis of empirical studies that supports the study objectives. Finally, the study provides theoretical and empirical justifications for including the control variables.

### International Trading Effect Theory

The international effect theory, also known as the flow-oriented theory or traditional approach, was proposed by Dornbusch and Fisher (1980). The theory assumes that exchange rates influence changes in the future cash flows of firms, thereby affecting stock returns (Makori, 2017). The theory advocates for the existence of a positive link between the two variables (Asare-Kyere, 2019). In more elaborate terms, movements in stock prices are sparked by variations in the exchange rate (Coronado, Gupta, Hkiri, & Rojas, 2020). Thus, any phenomenon that influences the future expected cash flow of firms' must be incorporated in the valuation of stock (Aydin, Pata, & Inal, 2021; Demir & Ersan, 2018), as suggested by the Efficient Market Hypothesis (EMH).

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The theory further argues that changes in exchange rates are driven by a country's performance in terms of trade and current account balances (Bala Sani & Hassan, 2018). According to this argument, exchange rate affects the value of stocks in the following ways: Firstly, it influences the competitiveness of the firm and then successively affects the cash flows of the firm (Ahmed, 2020). For example, depreciation of the domestic currency makes exporting companies' goods cheaper, attracting more foreign demand and sales for these products. This leads to an increase in sales revenue, which in turn leads to an increase in the firm's value.

Therefore, the international trading effect theory concentrates mainly on the impact the flow of capital through the competitiveness and profitability of the firm, since these two elements have an immediate impact on stock prices (Andriansyah & Messinis, 2019). As a result, exchange rate movements affect all firms, regardless of their involvement in international trade (Makori, 2017; Zivkov et al., 2018). However, the effect is more imminent for multinational corporations, importing firms, and exporting firms than for strictly domestic firms (Aggrawal, 1981). Exchange rate movements affect purely domestic firms through their input and output pricing channels, demand and supply chains, or rivalry pricing (Onyango, 2018). Multinational firms, on the other hand, are affected by their ability to compete internationally since they are exposed to transactional risk, translation risk, and operational risk (Ahmed, 2020).

This affects the profit levels of the firm and ultimately stock returns. Ofori-Abebrebese *et al.* (2018) contended that it affects the ability of the firm to remain competitive international wise, which has a resultant effect on the

country's balance of trade positions and subsequently the real output of the country, which eventually influences the expected cash flows and stock prices of these firms. Due the nature and type of transaction multinational firms engage in forex rate may either have a positive or negative influence on its stock returns. Makori (2017) held that the rise in value of domestic currency, limits exporting firms' ability to compete international wise, thus causing profit to fall which eventually causes a decline in stock returns. Tripathi and Kumar (2015) argued that variation in exchange rate influences international competitiveness through inputs and out pricing channel.

For instance, a rise in value of the domestic currency occasions prices exported products to rise, which results in a fall in demand for these exported goods (Dahir *et al*., 2018). This subsequently leads to a reduction in profit hence, triggering downward movement in stock prices. Whereas, to importing firms' appreciation in domestic currency causes imported goods to become less costly. Thus, leading to an increase in demand which reflects in their sales and profit. The increase in profit of firms would not only make the stock market more attractive but their respective sectors as well (Gatsi *et al*., 2016). Muhammad, Bhatti, and Raheman (2020) argue that direction of impact of appreciation of the home currency is dependent on whether the company is mainly an importing or and exporting company. The international trading effect theory specifies stock returns as the dependent variable.

This theory is in line with the first objective which seeks to examine the relationship between exchange rate and stock returns as it examines the causality between the two variables. Gokmenoglu *et al*. (2021) asserts that numerous empirical studies have validated the international trading effect

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theory in examining the connection between exchange rates and stock markets. Empirical evidence by of Qureshi *et al.* (2022), Mroua *et al*. (2020), Khan (2019), and Musawa *et al*. (2017), Kwofie *et al*. (2018), Owusu Junior *et al.* (2018), Makori (2017), Ofori-Abebrese *et al*. (2019), and Agyei *et al.* (2022) indicates that exchange rate drives the changes in stock returns.

**Portfolio Adjustment Theory**

The portfolio-adjustment theory was proposed by Branson, Halttunen, and Masson (1977) and Frankel (1983). This theory based on shortcomings of the international trading effect theory. Thus, international trading effect theory does not account for the role capital account plays in balance of payment (Khan, 2019). Under this theory, much emphasis is given to the role capital (financial) account plays in the determination of exchange rate. Here, it is assumed that exchange rate is determined by demand and supply of financial securities (Chen, Wang, & Cheng, 2009). According to the portfolio adjustment theory, there is a causal link between stock prices and exchange rates that is thought to be negative, leading to the conclusion that stock returns affect exchange rates (Effiong *et al*.,2019)

Thus, an increase in local stock returns causes the domestic currency to appreciate through both direct and indirect means. This is owing to the fact that an upsurge in stock values prompts investors to seek more domestic assets while simultaneously selling international holdings to acquire local currency required purchasing more local assets (Harb Sayed Ahmed, 2019). Consequently, rising domestic asset values result in greater wealth, which tempts investors to take on more debt, driving up domestic interest rates (Dar *et al*., 2014). High interest rates encourage foreign investment and increase

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demand for the native currency overseas, which leads to the currency's subsequent appreciation. Kwofie *et al*. (2018) assert that stock price and exchange rate fluctuations should be correlated negatively because falling stock prices reduce domestic wealth, which lowers domestic money demand and interest rates.

Additionally, a decline in domestic stock values results in less demand from international investors for both local assets and money. The changes in the demand and supply of money result in capital withdrawals, which cause the native currency to depreciate. On the other side, when stock prices increase, international investors are more inclined to buy domestic equity. As a result, they will gain from global diversification (Ali *et al*., 2020). Capital inflows and a strengthening of the local currency will result from this situation. Thus, this theory opines that capital account plays a major role in the determination of currency rate. The basic tenet of theory is that an increase in prices of local financial assets would attract more foreign investment, thereby instigating the appreciation of domestic currency (Boako *et al*., 2018). In other words, changes in exchange rate are influenced by movement in stock prices.

Further, the extent to which the portfolio adjustment theory explains the linkage between exchange rate and stock returns is dependent how liquid and segmented the market is (Adebowale & Akosile, 2018). Illiquid market for instance limits the timely trade of assets between buyers and sellers whereas, segmented markets is engulfed with high markets inefficiencies such as high transactional cost and large currency risk exposure (Andriansyah *et al*., 2019). The theory specifies stock returns as the independent variable (Mishra, 2016).

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This theory is grounded on a number of assumptions, one of which is forex rate is expressed as a function of foreign currency, local currency, foreign bonds and local bonds. Also, the theory considers interest rate to be unchanging. Additionally, the foreign country makes the price whilst the home country takes the price. Furthermore, expectation regarding movement in currency rate is featured in current forward price. Lastly, local currency and bonds are seen as alternatives for foreign currency and bonds. The portfolio Adjustment Theory was used to argue in favour the first objective as investors do not have a static trading pattern which changes based on their preferences. Hence investors turn to have a nonlinear trade pattern.

Thus, exchange rate is determined the demand and supply of money and assets (Hung, 2020). Studies such as of Agyei *et al*. (2022), Saidi *et al*. (2021), Živkov *et al*. (2018), Onyango (2018), Živkov *et al*. (2018), and Tripathi *et al*. (2015) found empirical evidence indicating that stock returns determine movement in exchange rate.

**Heterogenous Market Hypothesis**

The heterogenous market hypothesis (HMH) was proposed by Müller *et al*. (1993). This theory was based on the shortfalls of the efficient market hypothesis (EMH) by Fama (1998), the EMH has its main tenet being that the market is efficient, as market prices reflect all the relevant information. However, Tweneboah *et al*. (2020) argued that financial market composes of non-homogenous market participant, who have varying interpretation to the same information. Therefore, resulting in financial data is not normally distributed as investors tend to find different strategies to beat the market (Cheong, Cherng, & Yap, 2016).

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This theory recognises the differences in investors behaviour that arises as a result of information asymmetry (Ayei *et al*., 2022). Information that tends to affect investors' decision making include macroeconomic variables of which exchange rate plays an integral role, changes in economic policies, spill-over from other markets, and current economic trends (Asafo-Adjei *et al*., 2022). Therefore, changes in exchange rate causes investors to adjust the investment portfolio as it affects the returns accruing to them (Archer *et al*., 2022). This causes investors to act differently in the bearish, normal, and bullish markets (Boako *et al*., 2016) as they tend to trade in ways that would reduce the risk the are exposed to and maximise their profits (Ali *et al*., 2020).

From the above, exchange rate has a potential varying effect on investment returns which can premised on the varying behaviour of the investors. Based on this several empirical analyses (Ayei *et al*., 2022; Gokmenoglu, *et al*., 2021; Ali *et al*., 2020; Eyvazi *et al*., 2020; Tweneboah *et al*., 2020) have been conducted on the relationship between exchange rate and stock returns using HMH of which they have exchange rate to be having varying impact on stock returns.  The current study employs this theory in examining the effects exchange rate has on stock returns. This is because the Ghanaian market is inefficient thus information is not uniformly distribute coupled with low trading activities making investors react in nonlinear patterns to avert losses (Boako *et al*., 2016). This makes the HMH more applicable in Ghana as it assumes market inefficiencies.

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**Conceptual Review**

**Stock Returns**

Stock returns are the rewards given to investors for investing in a particular security (Makori, 2017). It can be in the form of dividend received or fluctuation in stock prices (Shinkeva, 2020). Since market risk causes stock returns to fluctuate, investors must constantly survey the market to determine when it would be prudent to purchase or dispose of securities (Owusu *et al*., 2018) so as to maximise wealth (Boako *et al*., 2016). These surveys or analyses include information coming from both the internal and external environments (Mishra, 2016). Thus, the current study defines stock returns the fluctuations in stock prices as it comprises of all market information. The unsteadiness in the stock market can affect investors' wealth either positively or negatively (Dahir *et al*., 2018).

According to Naseer *et al*. (2021), Adeniyi *et al*. (2020), and Mrouna *et al*. (2020), movement in stock prices indicates the pattern that a sector follows. Thus, a rise in market uncertainty could lead to the total collapse of the sector's market (Gokmenoglu *et al*., 2021). The unsteadiness in the stock markets is caused by many factors, of which exchange rate is key (Owusu *et al*., 2018). Kwofie *et al*. (2018) assert that exchange rates have more long-term effects than short-term effects. Since exchange rate effects are more felt in the long run, it could have adverse effects on the financial stability vision of policymakers. Thus, it is imperative to constantly monitor the changes in the markets so as to boost financial stability.

**Exchange Rate**

Exchange rate is the value of a country's currency in relation to another country's currency (Ahmed, 2020). This implies there are two components to exchange rate: domestic currency and foreign currency (Boateng, 2019). Exchange rates can be quoted directly or indirectly (Archer *et al*., 2022). The direct quotation implies the amount of local currency needed to purchase a unit of foreign currency (Nkoro *et al*., 2016), whereas the indirect quotation is the amount of foreign currency needed in exchange for a unit of domestic currency (Makori, 2017).

Exchange rate can be quoted in different currency however, the most renowned quotation home currency in relation to the United State Dollar (USD), Euro (EUR), the Great British Pound (GDBP), and the Australian dollar (AUD). The most widely used currency is the USD as it is a global reserve currency (Agyei *et al*., 2022). There are three main types of exchange rate regime: the fixed rate regime, managed-floated exchange rate regime, and the flexible regime. The extents of government influence determine the type of regime in operation.

**Stock Returns and Exchange Rate**

Undoubtedly, there exists a link between exchange rate and stock returns. Stock prices of sector on the GSE are determined by discounting the present value net expected cash flow accruing to the sector in the long term. The value of a given asset is more likely to increase if based on speculation; the sector anticipates obtaining more profit in the future. In contrast, if it expects a significant drop in its future cash flows, then the stock price would likely follow suit (Ofori-Abebrebese *et al*., 2019).

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Both theory and empirical discourse have asserted the link between exchange rate and stock returns. Dahir *et al*. (2018) indicated that variation in exchange rate first affects the firm's competitiveness since its influences revenues and operation cost. This is because, many firm relying on international market for funding in order to undertake their day-to-day operations (Adeniyi *et al*., 2020).  Depreciation of home currency as opposed to foreign currency makes sectors more competitive export wise whereas to importer depreciation of the local currency cause them to less competitive (Korley, *et al*., 2021).

**Ghana Stock Exchange**

The Ghana stock exchange (GSE) serves as an intermediary between lenders (investors) and borrowers (Firms) on the stock market. The concept of setting up a stock exchange in Ghana was under review for over 20 years, prior to its execution in 1990. In 1991, the Ghana stock market was officially launched and trading commenced on that same day. However, the overall total market capitalisation was very low as it fell between GHS 10 and 20 billion; this was because markets participants then had to trade manually in stocks (Cudjoe, 2021).

The introduction of the automated trading system (ATS) in 2008 saw a tremendous increase in the total market value of over GHS 20 billion as brokers, dealers, and traders could trade via a secured network (Awiagah & Choi, 2018). The launch of ATS paved the way of the use of the composite and financial index as opposed to the all-share index that existed prior to 2011 (Mensah *et al*., 2014). Currently, the Ghanaian stock market provides funding of thirty-eight companies distributed over eleven sectors namely: the mining,

finance, information & communication technology (ICT), distribution, food & beverage, insurance, manufacturing, agriculture, exchange traded funds (ETF), education, and advertisement & production with a total market capitalisation hovering around GHS 40 and over 60 billion. An efficient stock market would enhance better economic growth through promoting higher liquidity levels, rational decision making, diversification of risk, and good corporate governance (Dahir *et al*., 2018).

**Empirical Review**

Generally, there have been voluminous studies conducted in relation to exchange rates and stock returns for both developed and developing markets based on financial theory (Cudjoe, 2021). Exchange rate is said to affect the firms' value through operational cost and from the investor's perspective, exchange rate risk adds up the systematic risk of the investor. Since groups of firms form a sector, thus exchange rate has a potential influence on sectoral stock returns. Thus, the investors are interested in sectors that offer the highest return at a minimum risk (Ceautas *et al.*, 2017). Based on the potential threat exchange rate poses on stock returns, a lot of studies have been conducted.

These studies have been grouped into different aspects, one strand of literature as focus on the causality between exchange rate and stock returns. Some scholars observed a unidirectional causality between exchange rate and stock returns that is either change in exchange rate causes changes in stock returns or causal effect flows from stock returns to exchange rate (see Gatsi *et al*., 2016; Boako *et al*., 2015; Hung, 2020; Ahmed, 2020). Others have also advanced that there exists bidirectional causality between the currency and financial markets, in that these markets affect each other (see Parsva & Tang,

2017; Andriansyah *et al*., 2018; Dahir *et al*., 2018; Ahmed, 2020). While some academicians also advert that there no causal relationship between the variables (see Parsva *et al.,* 2017; Asare-Kyere, 2019; Gatsi *et al.*, 2016).

However, the examination of the causality between the markets does not indicate the magnitude of the relationship. Thus, other researchers focused on the cause-and-effect relationship between exchange rate and stock returns. Some studies advanced that increase exchange rate leads to an increase in stock returns (see Makori, 2017; Ofori-Abebrese *et al*., 2019; Giri & Pooja, 2017) while others indicated that an increase in foreign exchange causes a decrease in stock returns (see Onyango, 2018; Nkoro *et al*., 2016; Boako et al., 2015). Aside these findings on the cause-and-effect relationship between the variables, other scholars have considered the relationship in terms of different time preferences of the investor.

**Exchange Rate and Stock Returns at Different Time Horizons**

Empirical literature on the symmetric linkage between exchange rates and stock returns has been well estblished; With few studies considering the relationship from the short and long run perspective (Dahir *et al.*, 2018). Dahir *et al.* (2018) and Tripathi et al. (2015) investigated the dynamic link between exchange rate and stock returns of BRICS (Brazil, Russia, India, China, and South Africa) considering the different time horizons. Both studies observed an adverse relationship between the forex and currency markets. Nonetheless, Dahir *et al.* (2018), opined that exchange rate is more prevalent during the medium term to the long term except for China. Whilst Tripathi *et al.* (2015) observed that exchange rate exerts significant influence in only the long run for all the countries.

Khochiany (2018) also advanced that changes in stock prices in the long run are caused by changes in exchange rate. Effiong *et al.* (2019) assert that depreciation of home currency is predominant in the Nigerian stock market during long run.  While Harb Sayed Ahmed (2019) observed how exchange rate interacts with stock returns in the context of Egypt using nonlinear autoregressive distributive lags. The findings also asserted that changes in exchange rate affects stock returns. With the effect being more pronounced in the long run than the short run especially when the dollar appreciates in value against the Egyptian pounds.  Also, the above stated studies used ARDL as their estimation technique which assumes financial data is stationary, however, recent empirical evidence gather indicated financial variables are non-stationary (Archer *et al.*, 2022; Gatsi *et al.*, 2016). Thus, underlining the need to employ bivariate wavelet as it provides robust output whether the data is stationary or not (Tweneboah, 2020).

Contrary to the above finding, Mroua and Trabelsi (2020) indicated that effect exchange rate on stock markets is not only persistence in the long term but the immediate term as well.  Khan (2019) investigated how the downwards and upwards movement of the Reniminbi against the US dollar affects stock returns of Shenzhen. Khan (2019) advert that appreciation in Reniminbi as against the dollar will result in a decrease in stock returns. However, the effect of exchange rate is dominant in both short and long run. Findings from Lusaka also indicated that the effect exchange rate exerts on stock return is rather imminent in the immediate term (Musawa & Mwaanga, 2017).  The above stated works did not account for the medium term which forms parts of investors strategies (Owusu *et al.*, 2018). Therefore, the current

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study gives insight with regards to their medium-term investment decision of investors.

A study conducted in India on how macroeconomic variables affects stock returns, revealed that exchange rate has a significant positive impact on stock returns in the long run (Giri *et al.*, 2017). When the multi-scaled wavelet approach was applied to ascertain the relationship between exchange rate and stock returns for major emerging markets in Asia, it was revealed that the correlation between the two markets was weak across the different time horizons. Further, the co-movement between the two markets, however, deepened during the global financial crisis. It was also observed that during the immediate term stock returns leads whereas, in longer term exchange rate leads thereby asserting both the portfolio and international trading effect theory (Živkov *et al.,* 2018). These studies conducted were done in efficient markets, Boako *et al.* (2016) argued that, the Ghanaian market is inefficient, therefore, observations in other jurisdictions may not be applicable. Hence, necessitating the need to examine the relationship in terms of Ghana.

Qureshi *et al.* (2022) on the other hand found that, exchange rate rather leads in the short term, whereas in the long-term stock-oriented theory persists in the Pakistan stock market. In favor of the findings of Qureshi et al., (2022), Saidi, Muthalib, Adam, Rumbia, and Sani (2021) also observed that in the short run; changes in stock returns are caused by depreciation and appreciation in home currency. Based on the empirical evidence acquired, it is obvious that there has been a substantial literature on developing markets in other parts of the world. Agyei *et al*. (2022) observed that, the short term offers greater diversification possibility since stock returns leads the co-

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movement between the two assets in Africa. Onyango (2018), on the other hand, suggested that each economy is subject to different market situation, necessitating the need to determine the connection between currency rate and stock returns for a certain country.

Following these, there has been some studies conducted in Ghana that examines the relation between exchange rate and returns on capital during different time horizons, however, these studies are limited in number (Owusu *et al*., 2018). Kwofie *et al.* (2018) used ARDL at the market level to investigate the connection between exchange rate and stock returns. It was discovered that variations in stock returns are caused by exchange rate movements in both the short and long run. Similarly, Owusu *et al*. (2018), who evaluated the finance index in addition to the stock market index, revealed that the exchange rate is dominant across all time horizons.

Owusu *et al.* (2018) indicated that there is a need to obtain empirical evidence pertaining to the relationship between the currency movement and stock returns at the various industries as each sector may respond differently based on their uniqueness and vulnerabilities. Aside the finding co-movement between the foreign exchange market and securities market at different time intervals, additionally studies have considered the effect exchange rate has on stock returns at different market condition.

**Exchange Rate and Stock Returns at the Various Market Conditions**

There have been numerous calls by academicians, investors, policy regulators, industry players and portfolio managers around the world to examine the dynamic association between forex rate and returns on financial assets at the various market situations. According to Eyvazi, Mojahedi, and

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Mohammadi (2020), there are three markets situation that is the bearish market (recession or turbulent or crisis period), normal (calm) market, and bullish (market expansion). At the recessionary state the market turns to contract. Events such as the global financial crisis in 2008, Euro debt crisis in 2009, and presently coronavirus (Asafo-Adjei *et al.,* 2020) also contributes to market recession. In times of crisis, there is fall in stock returns since investor limit their investment in risky assets and invest rather in risk free asset (Tweneboah *et al*., 2020) with exchange rate generally around such times being unpredictable (Ali *et al*., 2021).

During turbulent times, there exists strong correlation between the markets which limits the investor's ability to diversify (Moagăr-Poladian, Clichici, & Stanciu, 2019). The normal market is also known as the low volatility period.  Although, there is oscillation in exchange rate during the normal period but it is relatively low as compared to recessionary period. Nevertheless, countries that are not self-sufficient tend to witness rapid depreciation of their home currency as against foreign currency (Onyango, 2018). Every economic contraction is followed by economic boom also known as market expansion or bullish market (Archer *et al*., 2022). In the bullish market, activities in the market are defined at the upper tails (Twenboah *et al*., 2020).

The interdependency between the currency markets and financial market at the various market situations is of particular importance not only to investor but policy makers and portfolio managers as it has the tendency of contributing stock market crash (Jeon, 2021). In addressing this potential threat, several empirical analyses have been conducted on the linkage between

exchange rate and stock returns. Chkili and Nguyen (2014) used a regime switching model to examine the relationship between the forex and financial markets for the BRICS (Brazil, Russia, India, China, and South Africa) from March 1997 to February 2013. The findings show that fluctuations in stock prices are caused by the weakening or strengthening of the home currency in both normal and recessionary markets, confirming flow orientated theory.

While Mishra (2016) mentioned that fluctuations in asset returns generate major changes in exchange rates in various market scenarios for Brazil, Russia, and India. China, on the other hand, confirms the existing portfolio balancing hypothesis, but only at the lower tail after analysing monthly data from January 1998 to June 2015. Jeon (2020) examines the interplay of macroeconomic and non-macroeconomic factors on stock returns in the Korean tourist industry using monthly data from January 2001 to December 2018. It was been noticed that the fall of the Korean won contributes to a large increase in tourism sector earnings.

Similarly, an Iranian study found that, there is an asymmetric connection between the exchange rate and equity returns at various quantiles, however the effects of exchange rate on stock returns is more pronounced in the bullish market (Eyvazi, Mojahedi, & Mohammadi, 2020). Moagăr-Poladian, *et al*. (2019) observed the relationship between exchange rate and stock returns for Central and Eastern Europe. The results obtained after employing GARCH indicates turbulent times (global financial crisis and euro debt) there exists a strong correlation between the two the two markets, which limited the investors' ability to diversify. In calm times, there exist weak

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association between currency and financial markets which afford the investor ability to diversify his/her risk.

Ali *et al*. (2020) applied Multivariate GARCH (MGARCH) and quantile regression in ascertaining the relationship between exchange rate and stock returns in the context of Pakistan using daily and monthly data series covering a period from 2001: Q3 to 2018: Q2. The findings show that, exchange rate has an obvious negative effect on stock returns throughout the distribution. Similarly, Muhammad *et al*. (2020) added to work of Ali *et al*. (2020) by extending the sample period to 30th June, 2019 using only MGARCH in examining how the two markets interact during economic crisis. From the findings, it can be inferred that foreign currency rate has a more profound effect on asset returns during market volatility.

The estimation technique used by Ali *et al*. (2020), Muhammad *et al*. (2020), and Moagăr-Poladian, *et al*. (2019) is challenging as it observes the relationship between the said variables in a symmetric manner (Mishra, 2016). Coronado *et al*. (2020), however argued that, investors do not behave in a symmetric order as they react differently to the same information available. Therefore, the current study uses quantile regression to account for the information asymmetry that exist in the market.

Dar *et al*. (2014) also analysed the association between the two markets for the Asian market and found exchange a significant adverse effect on stock returns throughout the distribution for all the countries except Sri Lanka and Bangladesh which documented a significant relationship at only bullish markets.

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With regards to Turkey, Tekin and Hatipoğlu (2017) used quantile regression technique to investigate the relationship between exchange rate and stock returns. The findings indicate that exchange rate has both negative and positive impact on stock returns across the distribution. However, the exchange rate is more prevalent at the upper tails. Although, the above studies used quantile regression as their estimation technique, but their works are situated at other regions where their economic conditions differ from that of Ghana (Makori, 2017), hence, calling for the need to examine the relationship in Ghana.

A similar study was conducted at Gulf of Arab where the flow oriented and the stock-oriented theories were tested using Markov-switching vector autoregressive model (MS-VAR). The outcome shows that, exchange rate does not influence stock returns in neither the calm times nor the crisis period. However, asserts that movement in exchange rate is under pinned by changes in stock returns. VAR, however, assumes financial data are normally distributed. According to Aydin, Pata, and Inal, (2021) financial data are charateristised by heteroskediascity, skewness, and excess kurtosis. This gives the impetus to use quantile regression as it does not focus on the only the conditional mean but the entire distribution (Hung, 2020).

Gokmenoglu *et al*. (2021) employed the quantile-on-quantile regression on monthly dataset which covered the period of January, 1994 to March, 2019 for emerging economies. The empirical results reveal that exchange rate plays a crucial role in determining stock returns either in the bearish or bullish market. While Korley *et al*. (2021) examined the relationship in the context Sub-Sarahan Africa markets using the regime

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switch model, and realized that stock prices lead during both low and high volatile regimes for sub-Saharan markets.  The above studies were examined in other economies with exception of Korley *et al*. (2021) who examined Ghana in addition to other countries. However, the method used by Korley *et al*. (2021) becomes problematic when examining time dependent probability.

Therefore Boako *et al.* (2016), considered only the stock returns of the Ghanaian markets using quantile regression which gives robust. The results indicated that the relationship between the variables using international trading effects is more observable than the stock-oriented theory in Ghana.  Boako *et al.* (2016) considered the relationship at the market level. Cuestas *et al.* (2017) nonetheless maintained that, measurement of stock returns at the aggregate level conceal the difference that persist in the various sector, thus there is a need to analyse the relationship at the sectoral level.

Also, the sample period used by Boako *et al.* (2016) does not consider major events such as the commissioning of additional oil fields in 2015, the financial sector restructuring in 2017 to 2018, COVID-19 in 2020 and the current currency crisis in 2022. Thus, the current study extends the sample period of Boako *et al.* (2016) to 2022 to examine all these structural changes as the have a potential effect on investors decision making.

**Control Variables**

The study controls for macroeconomic indicators such as inflation and interest rates, as these variables could contribute to the uncertainty associated with stock returns. The controls used in the study can be explained using the HMH, as it states that information on macroeconomic indicators (inflation and

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interest rate) tend to depicts changes in stock returns. Therefore, the study uses the HMH in explaining the effects interest rate inflation has on stock returns.

As changes in inflation and interest rates have implications on the firms' profits in a varying way (Suhadak *et al*., 2020). On the one hand, inflation affects sales, whilst interest rate affects finance cost of the firm (Boateng, 2019; Ofori-Abebrese *et al*., 2019; Gu, Zhu, & Wang, 2022). In other words, an increase in inflation will cause sales to fall as selling prices become costly. An increase in interest rates would, however, imply more savings as opposed to investment. The rise in either of these elements has an adverse implication on the firms' expected cash flows, which in turn affect stock returns (Makori, 2017).

Similarly, a fall in either of the elements has a positive influence on stock returns (Onyango, 2018). The effects these variables have on stock returns can be explained from the perspective HMH. The theory advert inflation and interest rate play a key role in explaining stock returns. Based on this, numerous studies have been conducted, among which Suhadak *et al*. (2020) observed that interest rate and inflation rate affect stock returns negatively and positively, respectively. Ofori-Abebrese *et al*. (2019) also affirms that interest rate affects stock returns negatively. Contrary to the findings of Suhadak *et al*. (2020), Makori (2017) and Onyango (2018) contended that a rise in inflation rate would lead to a fall in stock returns, whereas Gu *et al*. (2022) indicated that interest rate had a positive effect on stock returns.

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**Conceptual Framework**

The conceptual framework emanated from the hypotheses. The variables of this study consist of stock returns and foreign exchange rate. The study used interest rate together with inflation as it controls.
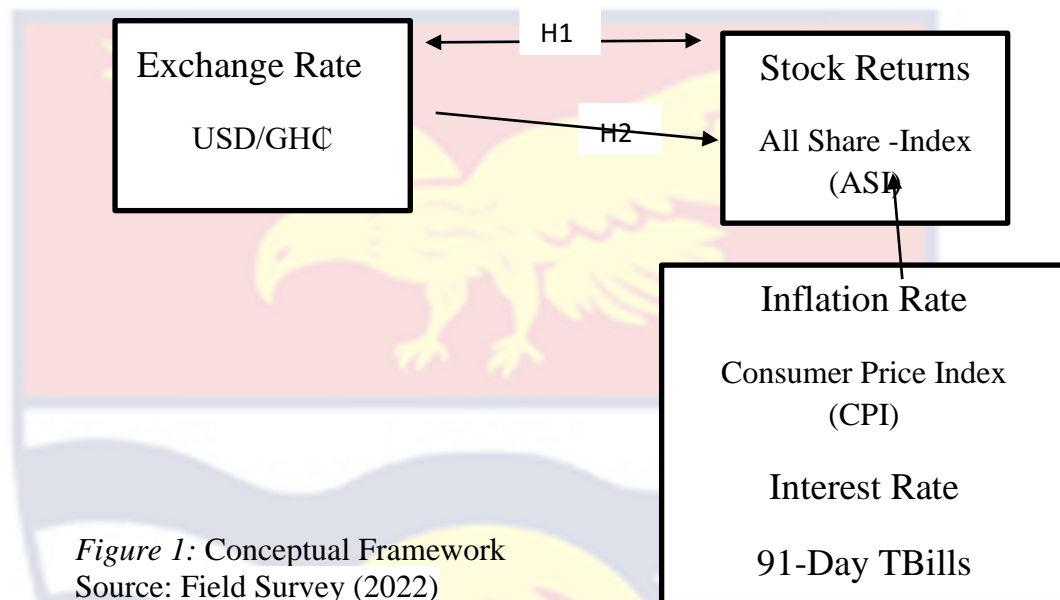


*Figure 1:* Conceptual Framework
Source: Field Survey (2022)

**Gaps in the Literature**

A review of the theories and a number of empirical works exposes a number of gaps. First and foremost, majority of the studies reviewed focused on advanced economies with less attention paid to developing nations like Ghana. Although, there have been some studies conducted in Ghana, however most of these studies considered the relationship between currency rate and stock returns at the market or aggregate level. Also, one noticeable thing about empirical evidence gathered in Ghana is that, most of these studies used the stock-oriented theory instead of the flow-oriented theory, thus rather looking at the effect stock returns has on exchange rate. Aside that, earlier works in Ghana considered the connection between the two markets as a statistic.

Thus, the current varies in its response to investigating the interconnection between the two variables by adding to the limited literature in

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Ghana by assessing the relationship at sectoral level across the various time horizons, as well as, various market situations.

**Chapter Summary**

This chapter was composed with the goal of reviewing the theories and empirical work that have already been done in the field. The section set the tone for elucidating the three theories that guides the study, after which review of the concepts in the study was carried out, this provided justification for the inclusion of the control variables. Next to follow was the empirical review and conceptual framework, this also provide support for the connection between the main variables of the study. The chapter then identified gaps in the literature before concluding with a summary of the chapter.
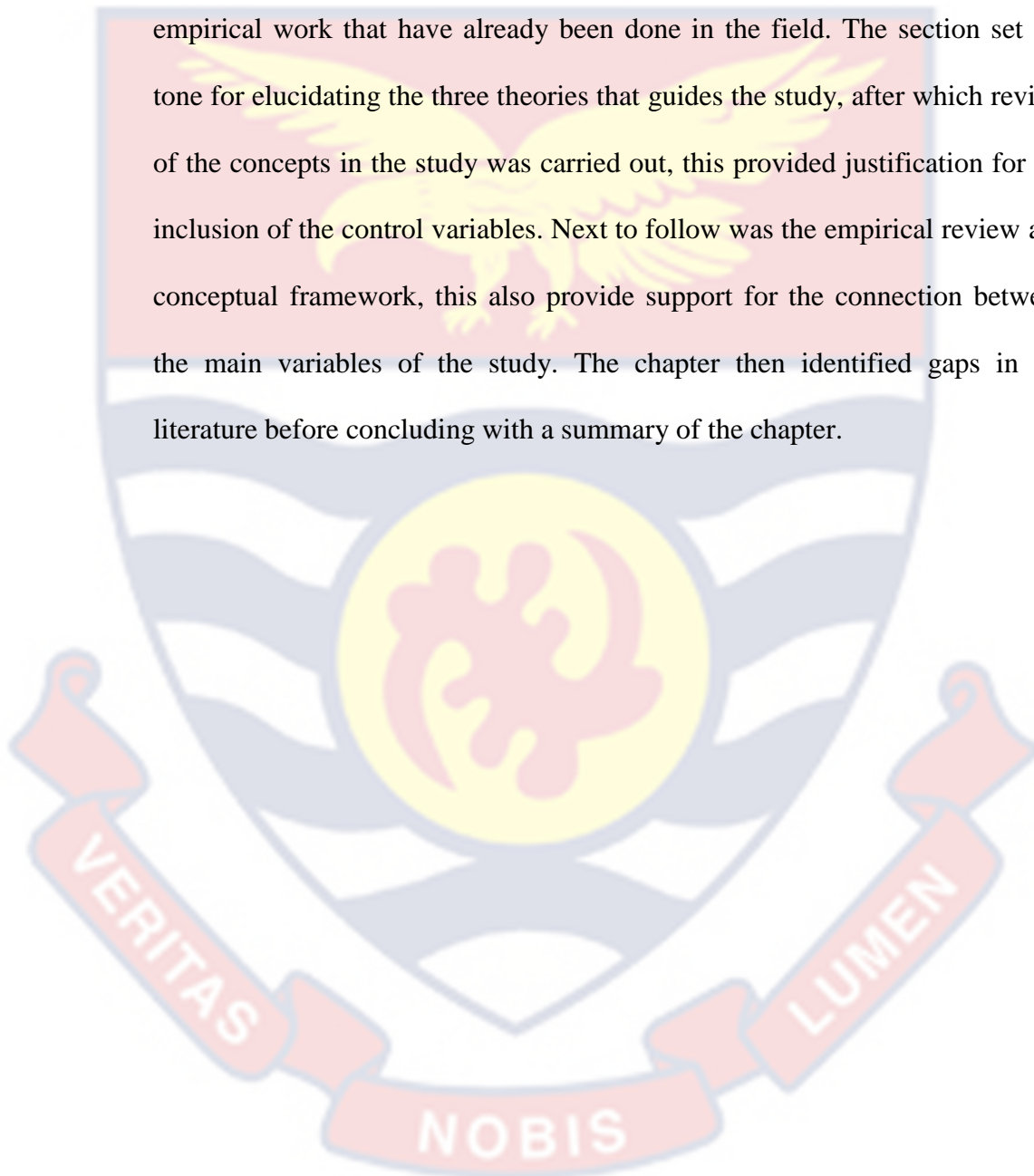
# CHAPTER THREE

# RESEARCH METHODS

## Introduction

This section discussed the methods and techniques used to investigate the link between exchange rate and stock returns of different sectors in Ghana. Therefore, this section assists the study in verifying that the data collected facilitates it in testing theories and hypotheses as clearly as possible. This chapter discussed the philosophy, design, approach, data collection procedures and sources, model specification, data processing tool and estimation strategy, measurement of variables, and chapter summary.

## Research Philosophy

The study focuses on the positivism philosophy since it draws conclusions based on positive verification of observable reality rather than basing conclusions on emotions or by mere instinct (Onyango, 2018). This makes it possible to measure and quantify the variables of the study (Buabin, 2016). The positivist approach entails the gathering of data, analysing data, and then confirming or disproving hypotheses in order to draw conclusions (Abeka, 2018). The main purpose of a positivist is to generate a reliable outcome, which is usually quantitative in nature, from which a forecast about a general phenomenon can be made (Boateng, 2019).

Thus, the study adopted the positivism philosophy since the study entailed the gathering of data on exchange rates and stock returns; analysis of data to uncover relationships using statistical tests of significance; and then proceeding to either affirm or disprove the linkage between exchange rates and stock returns.

**Research Design**

The study was based on explanatory research design as its main goal was to establish a cause-and-effect link between variables (Saunders, Thronhill & Lewis, 2009). An explanatory research design is termed ideal when the scholar is aiming to explain how the phenomenon works by discovering the underlying variables that cause change in it, in which case the independent variable is not manipulated (Kerlinger & Lee, 2000). Thus, the study employed an explanatory research design to explain the linkage between exchange rate and sectoral stock returns.

**Research Approach**

The quantitative research approach was used in the study since it concentrates on the use of mathematical models, theories, and hypotheses relating to the phenomena being studied (Creswell, 2009). This study takes a quantitative approach because statistical computations will be required to draw conclusions.

**Data Collection Procedures and Sources**

The study explained the linkage with regards to exchange rate and sectoral stock returns in Ghana. In accordance with the study's objectives, secondary monthly data on stock returns for seven sectors were obtained from the Ghana Stock Exchange (GSE), while data sets on the exchange rate and other macroeconomic variables (inflation and interest rate) were obtained from the Central Bank of Ghana (CBG). Further, the study only considered seven out of eleven sectors based on the consistency of data availability for those sectors. The choice of sample period is backed by current market trends such as the currency crisis in 2014-2015, the commission of more oil fields in

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Ghana in 2015, financial sector meltdown in 2017, COVID-19 in 2020, and the current currency crisis in 2022 which have the tendency to shoot-up stock market performance.

**Model specification**

The bivariate wavelet coherence was used to assess the co-movement between forex rate and stock returns. The model used is specified as:

$$W_{yz} = W_y(\tau, s)\ W_z^*(\tau, s), \tag{5}$$

Where $W_y(\tau, s)\ and\ W_z^*(\tau, s)$ represent the cross-wavelet of the two-time series, y(t) and z(t) and * indicates a complex conjugate (Kang, McIver, & Hernandez, 2019).

A quantile regression was employed to examine the influence changes in exchange rates have on stock returns after controlling for inflation and interest rates. The model employed in the study is:

quency domain is defined as:

$$RT_t = \beta_0(\theta) + \beta_1 \Delta FX_t(\theta) + \beta_2 INF_t(\theta) + \beta_3 IR_t(\theta) + \mu_t(\theta) \tag{8}$$

Where $RT_t$ is the stock returns at time $t$, $\Delta FX_t$ denotes changes in exchange rate at time $t$, $INF_t$ is inflation rate at time $t$, $IR_t$ represents interest rate at time $t$, $(\theta)$ denotes the $\theta th$ quantile of the regressors, $\beta$ is the estimated parameters equation at each quantile, $\mu_t$ denotes error term at time $t$ without a specific distribution form.

**Data Processing Tool and Estimation Strategy**

The study employed a time series design instead of a panel design because the use of a panel design would only give an average response and hence it does not give an in-depth knowledge on how each sector reacts (Asafo-Adjei *et al.*, 2020). The data was processed in R Studio after it was

collected in Excel. Firstly, in analysing the relationship between exchange rate and stock returns across time and scale, the bivariate wavelet was employed. In examining the co-movement among the stock returns and foreign exchange rates for listed sectors in Ghana, the Morlet, Arens, Fourgeau, and Glard's (1982) continuous wavelet transform was applied. According to Grinsted, Moore, and Jevrejeva (2004), the Continuous Morlet Wavelet Transform (CMWT) is very effective at overcoming the scale and frequency localization barrier.

A wavelet transformation function decomposes a time series into a set of elementary functions known as daughter wavelets, $\psi_{\tau,s}(t)$, , which are formed from a mother wavelet $\psi$ (t) and are associated with the frequency (t) (Nasreen, Naqvi, Tiwari, Hammoudeh & Shah, 2020). The mother wavelet can be expressed as:

$$\psi_{\tau,s}(t) = \frac{1}{\sqrt{s}} \, \psi\left(\frac{t-\tau}{s}\right) \tag{1}$$

Where $\frac{1}{\sqrt{s}}$ is the normalization factor that ensures wavelet transforms are consistent across time scales and $\tau$ and $s$ are the translation and dilation parameters given as functions of time and scale accordingly? As a result, the Morlet wavelet can be specified as:

$$\varphi^M(t) = \pi^{\frac{-1}{4}} \, e^{i\omega_o t} e^{\frac{-t^2}{2}} \tag{2}$$

Where $\omega_o$ is the angular frequency set to 6 as done in Asafo-Adjei, Adam and Darkwa (2021) and $\frac{2\pi}{2}$ being the inverse of the frequency (Owusu Junior *et al.*, 2017).

Given a time series of y(t) in reference to a chosen mother wavelet can be decomposed as follows:

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$$\omega_y(\tau, s) = \int_{-\infty}^{\infty} y(t) \frac{1}{\sqrt{s}} \psi(\frac{t-\tau}{s}) dt \qquad (3)$$

If a specific wavelet $\psi(.)$ i is chosen, equation (3) becomes

$$Y(t) = \frac{1}{C_\varphi} \int_0^\infty [\int_0^\infty W_y(\tau, s) \psi_{\tau,s}(t) d \tau] \frac{d_s}{s^2}, \ s > 0. \qquad (4)$$

In order leverage on the shortcomings of the wavelet power spectrum, the wavelet cross-spectrum transform, which is effective at measuring the connection between two non-stationary time series (Tiwari and Olayeni, 2013) was employed. The wavelet cross-spectrum transform which describe the covariance in the time-frequency domain is defined as:

$$W_{yz} = W_y(\tau, s) \ W_z^*(\tau, s), \qquad (5)$$

Where $W_y(\tau, s)$ $and$ $W_z^*(\tau, s)$ represent the cross-wavelet of the two-time series, y(t) and z(t) and * indicates a complex conjugate (Kang, McIver, & Hernandez, 2019). The wavelet coherence is defined as the squared absolute value of wavelet cross-spectrum normalization to a single spectrum of wavelet power (Rua and Nunes, 2009) is given as:

$$R^2(y, z) = \frac{|\lambda(\frac{1}{s} W_{yz}(\tau,s))|^2}{\lambda(\frac{1}{s}|W_y(\tau,s))|^2 \lambda(\frac{1}{s}|W_z(\tau,s))|^2}, \qquad (6)$$

Where $\lambda$ is the smoothing operator in both time and scale and $R^2(y, z)$ is bounded by $0 \leq R^2(y, z) (\tau, s) \leq 1$. The exponent is the smoothed cross-wavelet spectrum's absolute value squared, while the reduction is the smoothed wavelet power spectra (Rua & Nunes, 2009). According to Liu (1994), wavelet coherency is beneficial in discovering transitory relationships across time series since it evolves over time. Any value near 0 suggests a weak correlation, whereas any value near 1 indicates a strong correlation. Based on the wavelet analysis, hotter colouration in the resulting heat maps indicates a stronger co-movement or correlation, and the statistical significance of the

coherence is investigated using Torrence and Compo (1998)'s Monte Carlo simulation technique due to unpredictable theoretical distribution of the cross-wavelet transform coefficient.

According to Tiwari and Olayeni (2013), Ftiti, Guesmi, and Abid (2015), Kang *et al.* (2019), and Asafo-Adjei *et al.* (2020), the wavelet transform coherence phase difference is expressed as follows;

$$\emptyset_{yz}(\tau,s) = \tan^{-1}\left(\frac{\Im\{S(\frac{1}{s}W_{yz}(\tau,s))\}}{\Im\{S(\frac{1}{s}W_{yz}(\tau,s))\}}\right), \text{ with } \emptyset_{yz} \in (-\pi, \pi) \qquad (7)$$

Where $\emptyset_{yz}(\tau,s)$ denotes the difference in phase which describes the possible lead/lag relationship, Madaleno and Pinho (2012) between two time series, $\Im$ and $\Re$ representing the imaginary and real operators respectively. The phase patterns, thus in-phase or out-phase are detected by the dimensional arrows in the wavelet coherence map (Boako & Alagidede, 2017). If the arrows point to the right, the two series y(t) and z(t) are said to be in phase while the leftward movement of the arrows indicate out of phase co-movement. Similarly, the sign of the phase which is portrayed in the upward and downward direction of the arrows implies which series is leading or lagging. This is represented in the Figure 1 below;

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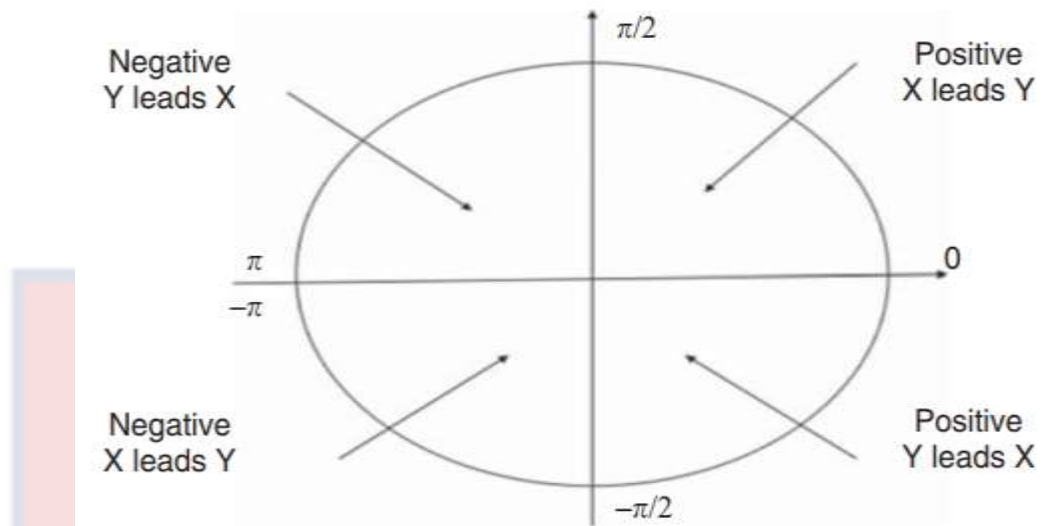
*Figure 2:* Implication of the phase difference
Source: Fan, Li, Shi and Su (2018).

Earlier studies such as Boako *et al.* (2016), Dar *et al.* (2014), Jeon (2020), Mishra (2016), Eyvazi *et al.* (2020) used quantile regression approach have indicated that it is more useful than the traditional least square method. The quantile regression approach which was proposed by to enable a detailed presentation of the structure and degree of the relationship Koenker and Basset (1978) between the variables under different market conditions (Baur, 2013). The approach is also more robust to outliers, skewness, and heteroscedasticity on the response variable (Koenker, & Hallock, 2001). Furthermore, the quantile regression provides an in-depth knowledge on how the explanatory variable influences the explained variable by allowing the estimation at the various quantiles' functions in the conditional distribution.

By virtue of it allowing for estimation at various points, it ends up given a heterogeneous response on the impact of the explanatory variable on the explained variable. Thus, the quantile model can be specified as follows:

$$Y_t((\theta|X) = \beta(\theta)X_t' + \mu_t(\theta) \qquad (9)$$

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Where $\beta_\theta$ is vector of the unobserved effect related with the $\theta th$ quantile. The quantile regression minimises $\sum_t \theta |\mu_t| + \sum_t (1-\theta) |\mu_t|$, thus the sum that offers asymmetric penalties is $\theta |\mu_t|$ for unpredictability and $(1-\theta)|\mu_t|$ for over prediction. The quantile estimators can be solved using the optimization problem specified below.

$$\min \quad \sum_{t\epsilon\{Y_t \geq X'_{t\theta}\}}^{n} \theta |Y_t - X'_t\beta| + \sum_{t\epsilon\{Y_t \geq X'_{t\theta}\}}^{n} (1-\theta)|Y_t - X'_t\beta| \quad (10)$$

Where $Y_t$ is the explained variable and $X_t$ is K by 1 vector regressors. The relationship between exchange rate and stock returns were examined across 19 different quantiles, thus from $0.05^{th}$ to $0.95^{th}$ quantile. These quantiles were selected to assess whether changes in exchange rate would have same impact on stock returns across the distribution.

Following the work of Archer, Owusu, Adam, Asafo-Adjei, and Baffoe (2022) activities in the bearish market can be defined from quantile 0.05 to 0.35, whereas, activities in the normal market and bullish market is defined as quantile 0.40 to 0.65 and 0.70 to 0.95 respectively.

**Measurement of Variables**

The measurement of the variables of the study is solely based on the fact that those measures are commonly used in literature. Asare-Kyere (2019) asserted that composite index is the best measure for stock returns, as it captures all market information on stock. However, based on the unavailability of data on the composite index at the sectoral level the study opted for the all-share index (ASI) as a comprehensive measure of stock returns. Ofori-Abebrese *et al*. (2019) have opined that investor are more interested in the movement ASI since it accounts for sensitive information such as macroeconomic indicators and economic development which directly

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influence the decisions of economic agents. The study therefore used ASI as a measure of sock returns as per the studies of Effiong *et al*. (2019), Onyango (2019), and Makori (2017)

Although, real exchange rate is a better measure of the country's ability to compete internationally, due to the inconsistency in data availability on developing countries in Africa (Archer *et al*., 2022) the study used the nominal exchange rate (USD/GHS). Makori (2017) argued that investors are mainly concerned about the variation in the nominal exchange rate as opposed to the real exchange rate. The dollar to cedi rate was selected based on the predominant use of the dollar relative to the AUD, GBP, and EUR in international transactions (Archer *et al*., 2022; Owusu *et al*., 2018; Onyango *et al*., 2018; Boako *et al*., 2016; Gatsi *et al*., 2016). Based on the dollar-cedi rate, a rise in exchange rate implies depreciation of domestic currency, whereas, a fall in USD/GHS rate is indicative that the cedi is appreciating.

The study also controlled for inflation rate and interest rate, these variables were measured using the consumer price index and 91-Day Treasury Bills respectively. All the variables were in the natural logarithm. Thus, the return series for all the variables was obtained as follows:

$$R_t = In\left(\frac{P_t - P_{t-1}}{P_{t-1}}\right) * 100.$$

Table 1 presents a summary of how the variables used in the study were measured, their sources, and empirical justifications.

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**Table 1: Variables, Measurement, and Sources**

| Variable | Measurement | Source | Empirical Justifications |
|---|---|---|---|
| Stock Returns | All-share Index | Ghana Stock Exchange | Ofori-Abebrese *et al.* (2019); Onyango (2018); Gatsi *et al.* (2016) |
| Exchange Rate | Dollar to Cedi Rate (USD to GHS) | Bank of Ghana | Archer *et al*. (2022); Asare-Kyere (2019); Owusu Junior et al. (2018); Gatsi *et al.* (2016). |
| Inflation Rate | Consumer Price Index (CPI) | Bank of Ghana | Ofori-Abebrese *et al.* (2019); Kwofie *et al.* (2018) |
| Interest Rate | 91-Day Treasury Bill Rate | Bank of Ghana | Boateng *et al.* (2019); Ofori-Abebrese *et al.* (2019) |

Source: Field Survey (2022)

**Chapter Summary**

This chapter describes the procedure used by the researcher in performing the study. This includes the philosophical stance; research approach; research design and all other applicable and appropriate methodological concern were sufficiently discussed with the necessary basis given. The chapter frames the process and techniques used to pinpoint way and manner information was gathered, and analysed. The next chapter examined the empirical data collected and the subsequent analysis for the study.

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## CHAPTER FOUR

## RESULTS AND DISCUSSION

**Introduction**

The study sought to analyse the influence exchange rate volatility exerts on stock returns of firms listed on the Ghanaian Stock Exchange (GSE) for the period 2014 to 2022. This section presents the outcomes of the study, these findings are discussed in line with the objectives in order to confirms whether the purpose of this study has been achieved or not. The chapter initially begins with descriptive statistics, then further proceeds to testing time series properties, and then finally the estimation results using both bivariate wavelet analysis and quantile regression analysis.

**Descriptive Statistics**

The study exhibits the descriptive statistics for the variables for the period of 2014 to 2022. According to the statistics in Table 2, the dataset used for the study exhibits excess kurtosis and skewness.

**Table 2: Descriptive Statistics**

| Variables | Mean | Std. Dev. | Skew. | Kurt. | J-B test P value | ADF |
|---|---|---|---|---|---|---|
| EXR | 0.0115 | 0.0398 | -0.4480 | 3.214 | 37.881 (5.947e-09) | 0.01 |
| INF | 0.0003 | 0.0614 | -1.3500 | 10.058 | 378.7 (2.2e-16) | 0.01 |
| IR | 0.0033 | 0.0370 | 1.075 | 8.250 | 263.21 (2.2e-16) | 0.01 |
| Stock Returns: Finance | 0.0001 | 0.0969 | 3.047 | 19.670 | 1423.8 (2.2e-16) | 0.01 |
| Distribution | 0.0029 | 0.3678 | 0.088 | 37.800 | 5007.5 (2.2e-16) | 0.01 |
| Food & Beverage | -0.0081 | 0.2579 | -0.3630 | 19.340 | 1321.2 (2.2e-16) | 0.01 |
| Insurance | 0.0053 | 0.0897 | 0.686 | 4.274 | 69.374 (8.882e-16) | 0.01 |
| Manufacturing | -0.0086 | 0.2054 | 0.367 | 15.132 | 800.28 (2.2e-16) | 0.01 |
| Mining | -0.0057 | 0.0509 | -1.081 | 15.872 | 891.29 (2.2e-16) | 0.01 |
| Agriculture | 0.0067 | 0.1647 | 3.240 | 19.264 | 1454.7 (2.2e-16) | 0.01 |

Note: Std.Dev is Standard Deviation, Skew is skewness, Kurt is Kurtosis, EXR is exchange rate (dollar-cedi rate), INF is Inflation rate, IR is Interest rate.
Source: Field Survey (2022)

This implies that the dataset employed in the study is not normally distributed, thus, providing motivation for the usage of quantile regression since the OLS presumes a normal distribution of the error term. In addition, the Augmented Dickey-Fuller (ADF) test rejects the null hypothesis of a unit root and concludes that the variables are stationary.

**Correlation Analysis**

The bivariate wavelet correlation is the advance form of the Pearson product–moment correlation which measures the co-movement between two variables at varying frequency. Thus, the use of Pearson product–moment correlation in the preliminary analysis is not out of place.

**Table 3: Correlation Analysis**

|        | EXR    | INF    | IR     | FIN    | DIST   | FOOD   | INSUR  | MANU    | MINING   |
|--------|--------|--------|--------|--------|--------|--------|--------|---------|----------|
| INF    | 0.055  |        |        |        |        |        |        |         |          |
| IR     | 0.02   | 0.03   |        |        |        |        |        |         |          |
| FIN    | 0.09   | 0.04   | -0.15  |        |        |        |        |         |          |
| DIST   | -0.09  | 0.14   | -0.04  | 0.19   |        |        |        |         |          |
| FOOD   | 0.05   | -0.20  | 0.01   | 0.07   | 0.03   |        |        |         |          |
| INSUR  | 0.03   | -0.24* | 0.03   | 0.49** | 0.16   | 0.26*  |        |         |          |
| MANU   | 0.04   | -0.21* | 0.09   | 0.15   | 0.00   | 0.21*  | 0.15   |         |          |
| MINING | 0.01   | 0.023  | 0.022  | -0.33**| -0.18  | -0.07  | 0.39** | -0.078  |          |
| AGRIC  | 0.061  | -0.166 | 0.34   | 0.61** | 0.24*  | 0.27** | 0.49** | 0.352** | -0.378** |
| N      | 94     | 94     | 94     | 94     | 94     | 94     | 94     | 94      | 94       |

**and* significant levels at 1% and 5% respectively

Note: EXR denotes exchange rate, INF denotes inflation rate, IR denotes interest rate, FIN denotes returns on finance sector stocks, DIST denotes returns on distribution sector stocks, FOOD denotes returns on food & beverage sector stocks, INSUR denotes returns on insurance sector stocks, MANU denotes returns on manufacturing sector stocks, MINING denotes returns on mining sector stocks, and AGRIC denotes returns on agriculture sector stocks.
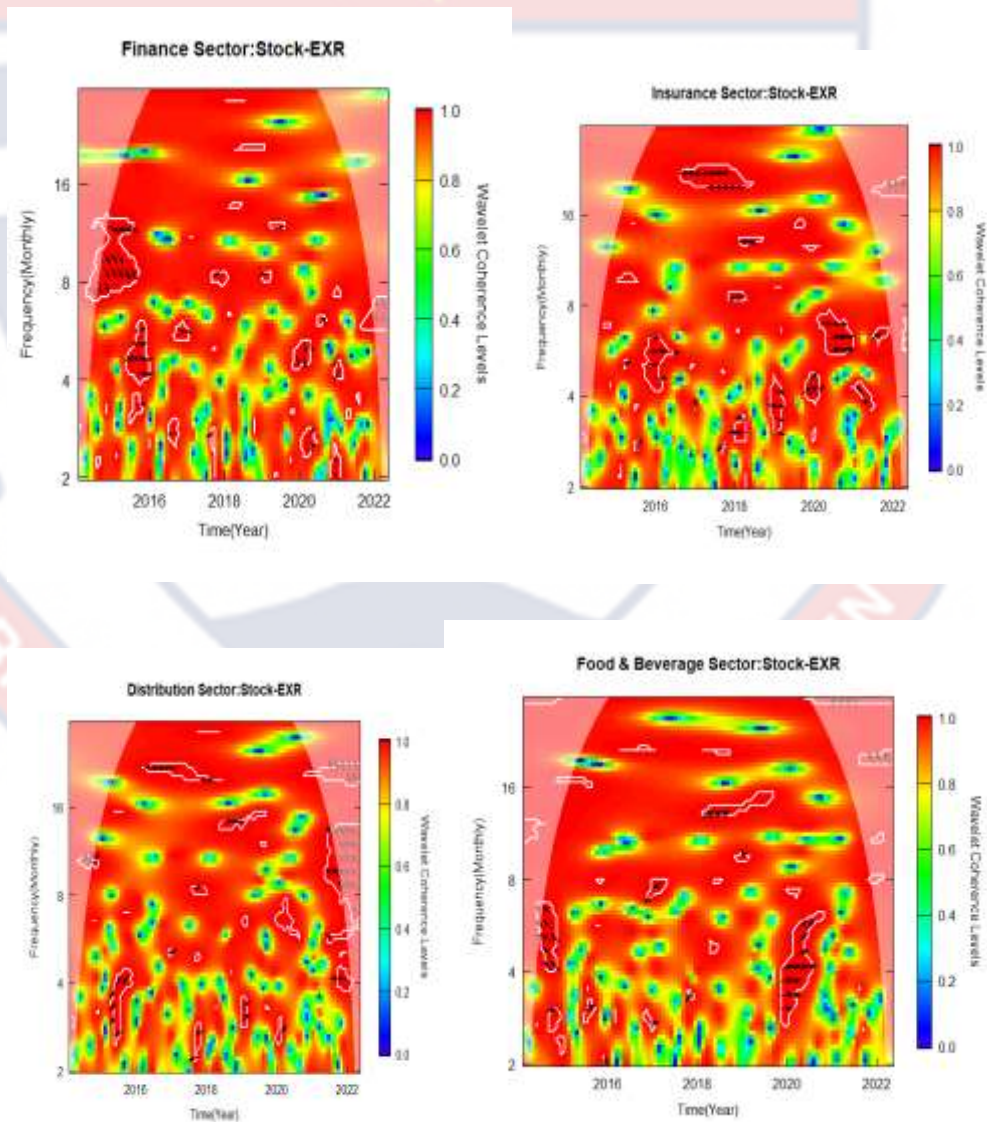
Source:  Field Survey (2022)

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Table 3 shows that all of the pairs are weakly (positively or negatively) correlated, with the exception of the AGRIC-FIN pair, which shows a moderate correlation (0.61). Also, the correlations for most pairs were insignificant. This does not pose any problem for the bivariate wavelet analysis as it considers individual relationship between the variables rather focusing on the collective relationship as presented by Pearson product–moment correlation (Owusu *et al*., 2018). Since the variables are weak or moderately correlated, it does not present the issue of multicollinearity (Adam, 2015) thus, the variables can be treated in the same quantile regression model (Archer *et al*., 2022).

**Analysis of Co-Movement between Exchange Rate and Stock Returns at the Various Time Horizons**

The wavelet coherency was utilised in this section of the study to analyse the co-movement of stock returns for sectoral distribution and exchange rates in Ghana. These plots shown in the study assess the bivariate co-movements in the frequency-time domains, using wavelet coherency as a measure of local correlation among our variables, and phase differences to illustrate any lag or lead (causality) relations between currency markets and equity market.  Further, under the wavelet coherency plot the area of significance is at 5% confidence with Bartlett default smoothing window type. For smooth transition in data interpretation, when the arrow is pointed in the right direction, it implies that the variables move in the same direction (in-phase), whereas, if the arrow is pointed in the left direction, it implies the variables move in the opposite direction (out-of-phase).

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In a more elaborate terms, if the arrow is left-pointing but downwards or right pointing but upwards it is suggestive that the first series is leading. On the other hand, when the arrow points to the left in an upward direction or points to the right in a downward direction it implies that the first series is lagging. Also, a red plate in a white contour at the bottom, top, left, and right side of the plot is suggestive of a strong co-movement at lower scales, higher scales, beginning of the sample period, and end of the sample period respectively. Additionally, if the arrows in the plot points to varying direction, then implies there exist phase-difference.
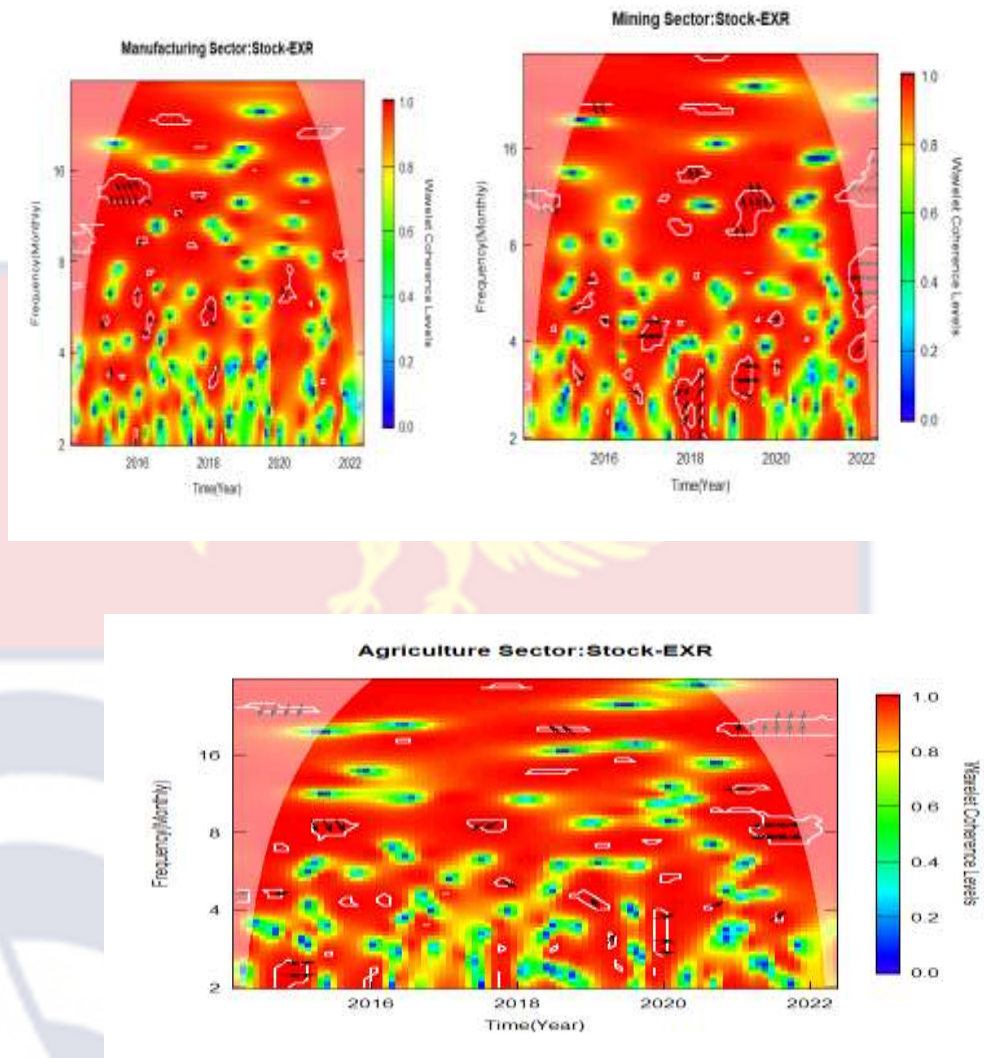
*Figure 3:* Co-movements of stock returns (stock) and exchange rate (EXR)
Source: Field Survey (2022)

A cross review of all the sectors indicate there exist phase-difference (positive and negative correlation) with narrowly identifiable lead-lag relationship across all frequencies and sectors which is significant at 5%, thus, the study fails to accept null hypothesis stating there is no co-movement between the two series. It was also identified that there exist no lead-lag co-movement across the frequencies. This implies that there exists no correlation or zero correlation between the two assets. The findings also indicate that in the short term (0-4 months-bands), stock returns lead the co-movement between Stock-EXR even with the mixture of right and left pointing arrows.

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The observation is consistent with findings of Agyei *et al*. (2022), Živkov *et al*. (2018), and Saidi *et al*. (2021) who discovered that in the short term, stock returns prevail in the Stock-EXR co-movement. The results are in support of the portfolio Adjustment theory which states causality run from stock returns to exchange rate.

In addition to the stock return dominated co-movement for all sectors in the short term, the finance and insurance revealed that exchange rate leads particularly around the COVID-19 crisis period.  This result implies that during the COVID-19 crisis the market is seen to be shrinking, thus, a rise (fall) in value of domestic currency would results in a rise (fall) in stock returns. This is because during such period's market uncertainty is heightened as investors fear losing their investment causing panic attacks here and there. This result in domestic investors liquidating their cedi denominated investment to buy assets denominated in dollars to cushion them from the extreme losses around this period. This pushes the demand curve for dollar upwards causing the cedi to depreciate against the dollar.

Immediately this happens, it boosts the revenue level of exporting sectors which then reflect in the increase in stock returns. This to the finance and insurance sectors will increase in the flow of international transactions causing stock returns of these sectors to go up. Empirical evidence obtained is in line with Moagăr-Poladian *et al*. (2019) who stated that investors decisions during crisis period is guided by the movement in exchange rate. Also, others studies such as of Qureshi *et al*. (2022), Mroua *et al*. (2020), Khan (2019), and Musawa *et al*. (2017), and Kwofie *et al.* (2018) supports the notion of exchange rate dominating the Stock-EXR relationship in the short term.

The figure additional provided information on the co-movement between the two markets at the medium term (4-8 month-band). The observation in the food & beverage sector highlights the possibility of both assets driving each other. Similarly, in the long term (above 8 month-bands) trends for the agriculture sector, depicts the existent of bidirectional causality. This goes to indicates that these two markets are highly integrated. The stock returns driven relationship indicates that changes in stock prices affect how both local and foreign investors behave, thereby causing the variations in the demand for money curve which in turn causes exchange rate to either appreciate or depreciates. This finding is supported by the empirical conclusion drawn by Agyei *et al.* (2022).

Again, the figure provides additional information on the relationship between exchange rate and stock return for the medium and long term. Aside the bidirectional causality existing in the food & beverage sector (4-8 frequency) and agriculture sector (above 8 bands), the results fairly indicates that exchange rate is a determining factor when it comes to the Stock-EXR relationship. As earlier explained exchange rate has key influence on managerial decision and by extension determines production, pricing, and marketing strategies which resultantly affect the profitability of the firm: thus, ultimately depicts the variation in the stock prices.

From the results it can be concluded that the international trading effect is eminent in the medium to long term. Also, the findings of this study are line with the conclusion drawn by Effiong *et al.* (2019), Harb Sayed Ahmed (2019), Khochiany (2018), Owusu *et al.* (2018), and Tripathi *et al.*

(2015) who argued that decision on which assets to invest in the market is guided by exchange rate.

In summary, the results revealed that there exist phase-difference and varying time horizon, which indicates that investors do not behave in a linear manner. Their behaviour is, therefore, guided by their needs and preferences at all times. Further, the results reveal that there exist narrowly identifiable lead-lag relationships with them being either no correlation, negative correlation as assume by the portfolio adjustment theory, or positive correlation as posit by the international trading effect theory across the frequency. The no lead or lag relationship and the negative relationship between the variables are more prevalent in the short and medium term than in the long term.

Thus, diversification opportunities exist in the various investment time horizons; they are however, limited in the medium to long-term as the markets are seen to be integrated.  As a result, investors' wealth may be severely affected, as they may suffer losses. Also, the result in the short and medium terms provides insight to policymakers on the establishment of a derivative market, which will afford the investor a better hedging possibility.

**Analysis of the Effect of Exchange Rate Changes on Stock returns at the Various Market Conditions**

To illuminate the link between stock returns and exchange rate, Table 4 reports quantile regression coefficient results with their respective *p*-value

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**Table 4: Quantile Regression Estimates for the Relationship between Exchange Rate and Stock Returns**

| Quantile | Finance Sector | Insurance Sector | Distribution Sector | Food & Beverage Sector | Manufacturing Sector | Mining Sector | Agricultural Sector |
|---|---|---|---|---|---|---|---|
| 0.05 | -0.0318 | -0.3336 | -0.2863 | -0.0121 | -0.1613 | -0.0142 | -0.2392 |
| 0.10 | -0.0180 | -0.3322 | -0.2863 | -0.0089 | -0.1020 | -0.0132 | -0.1190 |
| 0.15 | -0.0018 | -0.2126 | -0.2755 | -0.0028 | -0.0924 | -0.0027 | -0.1190 |
| 0.20 | 0.0124 | -0.0471 | -0.2083 | 0.0187 | -0.0872 | 0.0000 | -0.0191 |
| 0.25 | 0.0124 | 0.0938 | -0.2083 | 0.0187 | -0.0208 | 0.0000 | -0.0189 |
| 0.30 | 0.0124 | 0.0962 | -0.1801 | 0.0187 | -0.0172 | 0.0000 | 0.0000 |
| 0.35 | 0.0168 | 0.1375 | 0.0144 | 0.0293 | -0.0172 | 0.0000 | 0.0000 |
| 0.40 | 0.2438 | 0.1375 | 0.0242 | 0.0381 | -0.0043 | 0.0000 | 0.0000 |
| 0.45 | 0.2438 | 0.1375 | 0.0242 | 0.0381 | -0.0023 | 0.0000 | 0.0000 |
| 0.50 | 0.2806 | 0.3008 | 0.0242 | 0.0535 | 0.0004 | 0.0000 | 0.0000 |
| 0.55 | 0.5080** | 0.3008 | 0.0321 | 0.0535 | 0.0004 | 0.0000 | 0.0199 |
| 0.60 | 0.5080** | 0.3263* | 0.0321 | 0.0940 | 0.0099 | 0.0000 | 0.0309 |
| 0.65 | 0.5080** | 0.3522** | 0.0359 | 0.1467 | 0.0394 | 0.0000 | 0.0583 |
| 0.70 | 0.5207** | 0.3754** | 0.0627 | 0.2745 | 0.0529 | 0.0000 | 0.0664 |
| 0.75 | 0.5207** | 0.4964*** | 0.1043 | 0.3047 | 0.1195 | 0.0002 | 0.1773 |
| 0.80 | 0.6841*** | 0.5587*** | 0.1195 | 0.3149 | 0.1204 | 0.0004 | 0.2335 |
| 0.85 | 0.7223*** | 0.5587** | 0.1233 | 0.3631 | 0.1204 | 0.0004 | 0.5416 |
| 0.90 | 0.8441*** | 0.5768* | 0.2260 | 0.4064 | 0.1683 | 0.0004 | 0.9219 |
| 0.95 | 0.8441*** | 0.7108 | 0.3159 | 0.4163 | 0.2429 | 0.0045 | 0.9464 |

*** $p<0.01$, ** $p<0.05$, * $p<0.1$
Source: Field Survey (2022)

The results from the quantile regressions show that exchange rate has a varying effect on stock returns across the various market conditions. It obvious that, exchange rate tends to exert adverse influence on stock returns at the lower quantiles or the bearish market, whereas, in the normal market and bullish market exchange rate affects stock returns positively. Also from Table 5, it is clear that the coefficients of the regression estimates turn to be higher as the quantiles approaches the bullish markets. The empirical evidence ascertained in this study aligns with the study of Tekin *et al.* (2017) who also observed exchange rate having varying effects on stock return across the various market conditions with the coefficient increasing as the quantiles approach the bullish market.

Further, exchange rate is documented to cause no change in stock returns particularly for the mining and agriculture sector. This could be premised on the fact that firms in these sectors are multinational corporations and have their output valued and sold in dollars, thus, resulting in the no impact exerted by currency rate on stock returns. These results align with work of Asare-Kyere (2019) who exchange rate to be having no effect on stock returns in Ghana. Amidst all these findings, the results indicates that exchange rate has no significant influence on stock returns across the various markets conditions for all the sectors with exception of the later quantile of the normal and bullish market for the finance and insurance sectors. This observation is in accordance with findings of Jeon (2020) who found exchange

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rate to be having significant effects as the quantile progresses from the normal to the bullish market.

These insignificant effects could be aligned to the effectiveness of the redenomination policy in 2007 and the nature of the Ghanaian market in terms of low capitalisation (63,817.62 million as of 30 April 2022) and high market inefficiencies. The effectiveness in the cedi redenomination policy of 2007 in Ghana has caused exchange rate have no immediate impact on stock returns (Asare-Kyere, 2019; Gatsi *et al.,* 2016). As initially noted, the minimal market capitalisation coupled with inefficiencies in the markets, causes the effects of exchange rate to be unobservable (Ofori-Abebrese, 2019). Since it does not bring to bear the bearish and bullish behaviour of investors, which indicates the direction economic activities should take. The above stated finding is consistent with findings of Jeon (2020), Asare-Kyere (2019) and Gatsi *et al.* (2016) who contended that exchange has insignificant effect on stock returns.

As earlier stated, the effects were only observable in the case of the finance and insurance sectors (financial institutions) of the economy. Based on these findings the study fails to accept the null hypothesis stating exchange rate has no significant impact on stock returns at the various market conditions. Taking quantile 0.95 for example, it could be observed that a percentage increase in the dollar-cedi rates would results in 84.41% and 71.08% increase in returns of finance and insurance respectively. The results ascertained from the study indicate that finance and insurance sectors drive the

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other sectors which is in line with results from Boako *et al*. (2016). This could be explained by how the expansion in economic activities during the stable and booming markets attract significant inflows of funds.

During such periods, the economy is seen to be expanding thus attracting more foreign inflows into the stock markets. These inflows are mainly siphoned into the economy through these financial services providers (financial sector) for the use of non-financial sectors or indigenous firms. This result in an increase in  the profitability of these other sectors. The increase in profitability would imply that non-financial sectors can pay their loans promptly. This results in an increase in profit of these financial institutions and hence affects returns on their assets positively.

Also, the positive significant effects observable in the normal and bullish market can be attributed to the popular view on the Ghanaian economy being dollarise. According to Adabor *et al.* (2022) Ghanaians have lost confidence in the Central banks' ability to stablise the cedi, thus causing them to hold foreign currency (dollar) in addition to the cedi to serve as a buffer from the shocks in the currency market. By so doing, it causes the demand for the dollar to increase which results in depreciation of the cedi. The depreciation of cedi has positive implications on the profitability of exporting sectors; this positive impact is reflected in the profits of financial sector and thus having a favorable consequence on stock returns of these finance and insurance sectors.

The positive effects exchange rate exert on stock returns also implies a unit fall in exchange rate (appreciation in the cedi) would contribute to a 0.8441 and 0.7108 fall in stock returns of financial firms for the 95th quantile. In other words, appreciation of the cedi or a fall in dollar-cedi rates would results in the decline in stock returns of exporting sectors.  This is so because during the market expansion period foreign investors turn to be interested in increasing their holding in local assets as compared to foreign assets. Thus, by so doing, more of the cedi will be demanded thus causing the cedi to appreciate. Appreciation in the cedi will imply that output of export-oriented sectors will be costly in the international market thereby limiting their ability to compete globally. This reflects in low profit levels of these exporting sectors. Shinkeva (2020), Onyango (2018), and Makori (2017) argued that exchange rate having positive influence on stock returns which affirms the empirical results ascertained in this study as well.

As previously stated, these exporting firms receive funding in terms of loans from their bankers, thus the fall in profit of exporting firms will lead to a default in payment of loans. This eventually have an adverse impact on stock returns of these financial institutions. To mitigate the adversity associated with exchange rate and stock returns during volatile period, firm managers should rather use substitute raw materials in production of goods and services to reduce the cost of production. Where substitute inputs are non-existent, firms can trade with countries when the cedi is termed to be stronger than their home currency to reduce losses. Further, firms that rely on foreign markets for the

inputs could use flexible stock control policies such that in times when they suspect the cedi is going to depreciate in the near future they buy more now so as to compensate for the losses in the future period.

The Ghanaian government can take advantage of the period where the cedi is depreciating by issuing more cedi-denominated assets which would affects the demand and supply of the cedi thus restoring the cedi back to its equilibrium. Thus, in times when the cedi is appreciating, in order to protect the investors holding, the investor should diversify away his or her risk by investing in sectors that import. This would have a favorable impact on these financial institutions since they equally provide credit facilities to importing sectors.

Regulatory authority could pursue policies that would aim at stabilising the cedi and making the dollar less relevant in the Ghanaian markets.  For instance, reviewing high importation bills and also putting a limit on local firms that invoice in dollars thereby reducing the demand for dollars. Also, Ghana should review it trade liberisation policy in such a way that it will boost the performance of indigenous firms, thus reflecting in overall sectoral growth as opposed to foreign firms therefore causing the cedi to be strong relative to the dollars.

The results provided in in accordance with the heterogeneous market hypothesis (HMH) as the coefficient varies at the various market situations, indicating that investors have a varying reaction to available information. The findings of this study corroborate with works of Gokmenoglu *et al.* (2021),

Korley *et al.* (2021), Eyvazi *et al.* (2021), Ofori-Abebrebese *et al.* (2019), Tekin *et al.* (2017), Boako *et al.* (2016), Chkili *et al.* (2014) observed that exchange rate has positive implication on stock returns particularly in the normal and bullish market. Ali et *al.* (2020), Hung (2020), Mishra (2016), and Dar *et al.* (2014) on the other hand found that exchange rate has an adverse influence on stock returns in the normal and bullish market which is inconsistent with the findings of this study.
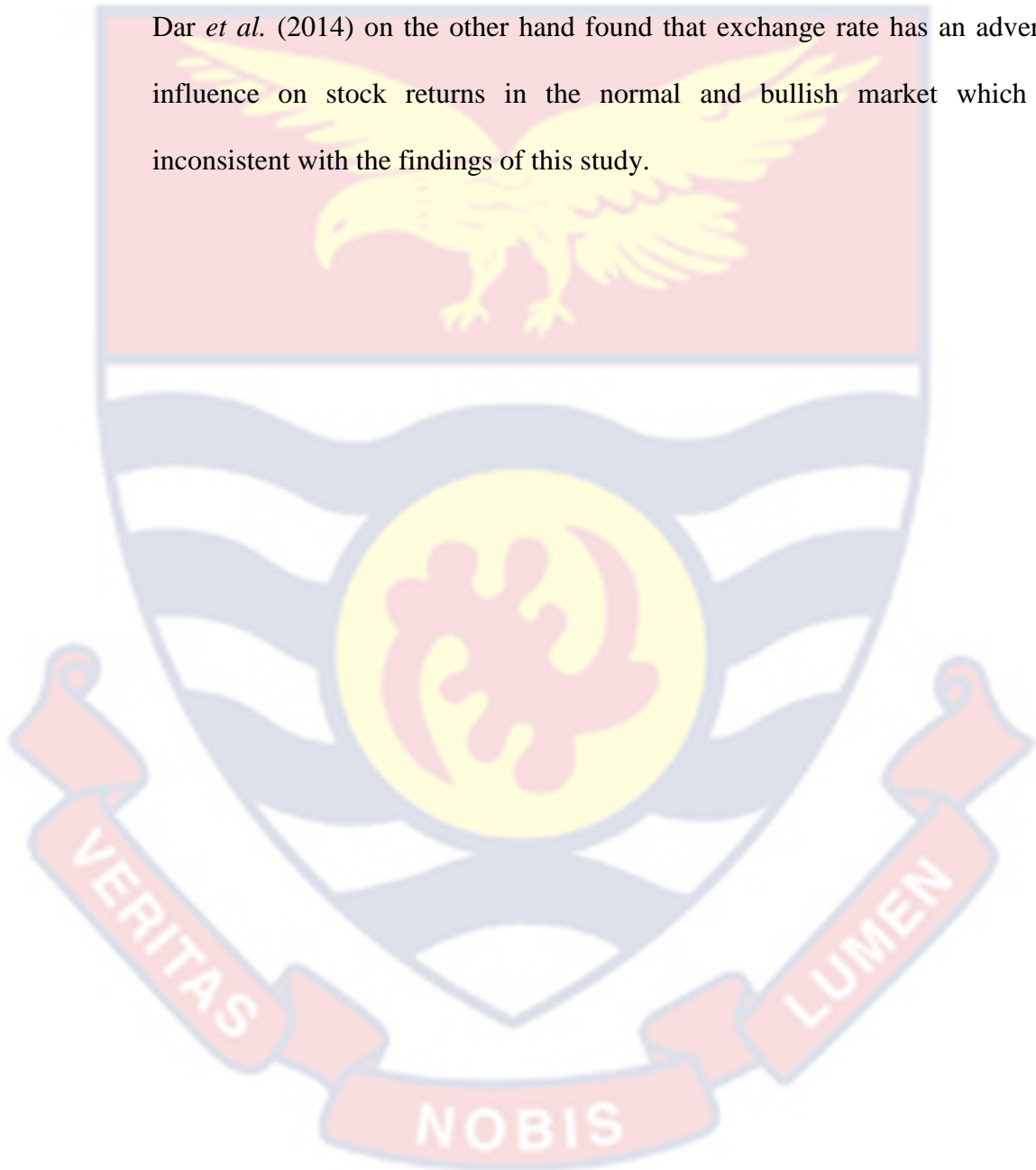
**Table 5: Quantile Regression Estimates for the Relationship between Inflation Rate and Stock Return**

| Quantile | Finance Sector | Insurance Sector | Distribution Sector | Food & Beverage Sector | Manufacturing Sector | Mining Sector | Agricultural Sector |
|---|---|---|---|---|---|---|---|
| 0.05 | -0.0154 | -0.1281 | -0.0782 | -0.1830 | -0.1007 | -0.0015 | -0.0211 |
| 0.10 | -0.0143 | -0.1137 | -0.0782 | -0.1831 | -0.0519 | -0.0014 | -0.0089 |
| 0.15 | -0.0123 | -0.1185 | 0.1075 | -0.1834 | -0.0344 | -0.0002 | -0.0089 |
| 0.20 | 0.0031 | -0.2448 | -0.0715 | -0.1842 | -0.0269 | 0.0000 | -0.0014 |
| 0.25 | 0.0031 | -0.6454 | -0.0715 | -0.1842 | -0.0538 | 0.0000 | -0.0014 |
| 0.30 | 0.0031 | -0.6444 | -0.0876 | -0.1842 | -0.0553 | 0.0000 | 0.0000 |
| 0.35 | 0.0057 | -0.6487 | -0.1557 | -0.1846 | -0.0553 | 0.0000 | 0.0000 |
| 0.40 | 0.1407 | -0.6487 | -0.1616 | -0.1850 | -0.0606 | 0.0000 | 0.0000 |
| 0.45 | 0.1407 | -0.6487 | -0.1616 | -0.1850 | -0.1041 | 0.0000 | 0.0000 |
| 0.50 | 0.1626 | -0.6658 | -0.1616 | -0.1856 | -0.1069 | 0.0000 | 0.0000 |
| 0.55 | 0.2973 | -0.6658 | -0.1812 | -0.1856 | -0.1069 | 0.0000 | -0.1644 |
| 0.60 | 0.2973 | -0.8637 | -0.1812 | -0.2402 | -0.1360 | 0.0000 | -0.1771 |
| 0.65 | 0.2973 | -0.8751 | -0.1802 | -0.2833 | -0.2439 | 0.0000 | -0.1931 |
| 0.70 | 0.3047 | -1.2089* | -0.1708 | -0.4631 | -0.2677 | 0.0000 | -0.1991 |
| 0.75 | 0.3047 | -1.1657* | -0.2419 | -0.4380 | -0.2300 | 0.0000 | -0.3411 |
| 0.80 | 0.4015 | -1.3157* | -0.2315 | -0.4414 | -0.2311 | -0.0001 | -0.4492 |
| 0.85 | 0.4254 | -1.3157* | -0.2293 | -0.4573 | -0.2311 | -0.0001 | -1.0470 |
| 0.90 | 0.4979 | -1.2724* | -0.1669 | -0.6930 | -0.3241 | -0.0001 | -1.2259 |
| 0.95 | 0.4979 | -1.5777* | -0.1147 | -0.7073 | -0.4691 | -0.0015 | -1.1115 |

*$***p<0.01, **p<0.05, *p<0.1$*
Source:  Field Survey (2022)

**Table 6: Quantile Regression Estimates for the Relationship between Interest Rate and Stock Return**

| Quantile | Finance Sector | Insurance Sector | Distribution Sector | Food & Beverage Sector | Manufacturing Sector | Mining Sector | Agricultural Sector |
|---|---|---|---|---|---|---|---|
| 0.05 | -0.4925 | -0.0810 | -0.3158 | 0.0297 | -0.0386 | -0.0191 | -0.1415 |
| 0.10 | -0.4916 | -0.0808 | -0.3158 | 0.0594 | -0.0191 | -0.0178 | -0.0099 |
| 0.15 | -0.4900 | -0.0859 | -0.3056 | 0.0595 | -0.0155 | -0.0008 | -0.0099 |
| 0.20 | -0.1887 | -0.0950 | -0.3059 | 0.0649 | -0.0184 | 0.0000 | -0.0016 |
| 0.25 | -0.1887 | -0.0135 | -0.3059 | 0.0649 | 0.0071 | 0.0000 | 0.0004 |
| 0.30 | -0.1887 | -0.0127 | -0.3032 | 0.0649 | 0.0085 | 0.0000 | 0.0000 |
| 0.35 | -0.1888 | -0.0303 | -0.2375 | 0.0843 | 0.0085 | 0.0000 | 0.0000 |
| 0.40 | -0.1960 | -0.0303 | -0.1349 | 0.0875 | 0.0135 | 0.0000 | 0.0000 |
| 0.45 | -0.1960 | -0.0303 | -0.1349 | 0.0875 | 0.0500 | 0.0000 | 0.0000 |
| 0.50 | -0.1972 | -0.0999 | -0.1349 | 0.0929 | 0.0525 | 0.0000 | 0.0000 |
| 0.55 | -0.2322 | -0.0999 | -0.0200 | 0.0929 | 0.0525 | 0.0000 | 0.0533 |
| 0.60 | -0.2322 | -0.1021 | -0.0200 | 0.0779 | 0.0534 | 0.0000 | 0.0440 |
| 0.65 | -0.2322 | -0.0691 | 0.0122 | 0.0572 | 0.0652 | 0.0000 | 0.0626 |
| 0.70 | -0.2380 | 0.0674 | -0.0041 | 0.1372 | 0.0578 | 0.0000 | 0.0646 |
| 0.75 | -0.2380 | -0.1257 | -0.0279 | 0.1421 | 0.0757 | 0.0000 | 0.1107 |
| 0.80 | -0.2646 | -0.1252 | 0.0289 | 0.1432 | 0.0938 | 0.0000 | 0.1458 |
| 0.85 | -0.2113 | -0.1252 | 0.0282 | 0.1484 | 0.0938 | 0.0000 | 0.1845 |
| 0.90 | -0.2152 | 0.1500 | 0.0793 | 0.1494 | 0.0952 | 0.0000 | 0.3978 |
| 0.95 | -0.2152 | 0.1694 | 0.0203 | 0.1533 | 0.0974 | 0.0005 | 0.3607 |

*\*\*\*p<0.01, \*\*p<0.05, \*p<0.1*
Source: Field Survey (2022)

Table 5 and 6 reports on the effects of the control variables (inflation and interest rates on stock returns used in the study, of which the results ascertained indicate that both inflation and interest rates have varying effects on stock returns. However, inflation was seen as having a significant adverse impact on returns for the insurance sector in bullish market. This implies that inflation rate will cause the cost of products sold by insurance companies to rise. This will result in a fall in demand for these products, thus causing a downward spiral in sales. Consequently, this leads to a decrease in profit, which affects both the firm's value and returns. This adverse significant effect can be attributed to the ineffectiveness of the inflation-targeting policy.

The findings of study are however in line studies by Suhadak *et al.* (2020), Kwofie *et al.* (2018), Makori (2017), Onyango (2018) and Boateng (2019) but however, contradict the findings of Ofori-Abebrese *et al*. (2019) who observed inflation rate to be having positive influence on stock returns.

**Robustness Test**

The current study used the same analyses in assessing the effects exchange rate has on stock returns using the overall all-share index for all the sectors studied to verify the consistency in the results provided by each sector.

**Table 7: Robustness Test**

| Quantiles | FX | INF | IR |
|---|---|---|---|
| 0.05 | -0.1762 | 0.0065 | -0.1057 |
| 0.1 | -0.1670 | 0.0064 | -0.0964 |
| 0.15 | -0.1289 | 0.0047 | -0.0981 |
| 0.2 | -0.1289 | 0.0047 | -0.0981 |
| 0.25 | -0.0935 | 0.0034 | -0.0924 |
| 0.3 | -0.0921 | 0.0050 | -0.0208 |
| 0.35 | -0.0672 | 0.0045 | 0.0043 |
| 0.4 | 0.0361 | -0.0002 | -0.0146 |
| 0.45 | 0.1393 | 0.0053 | -0.0556 |
| 0.5 | 0.1750 | -0.0068 | -0.0493 |
| 0.55 | 0.1750 | -0.0068 | -0.0493 |
| 0.6 | 0.2223 | -0.0086 | -0.0417 |
| 0.65 | 0.2223 | -0.0086 | -0.0417 |
| 0.7 | 0.2664 | -0.0103 | -0.0346 |
| 0.75 | 0.2790 | -0.0107 | -0.0326 |
| 0.8 | 0.3677* | -0.0141 | -0.0183 |
| 0.85 | 0.5046** | -0.0150 | 0.1917 |
| 0.9 | 0.5046** | -0.0150 | 0.1917 |
| 0.95 | 0.5268 | -0.0152 | 0.2258 |

*\*\*\* p<0.01, \*\* p<0.05, \* p<0.1*
EXR represents changes in exchange rate, INF represents changes in inflation rate, and IR represents changes in interest rate.
Source: Field Survey (2022)

From the table, the results provide credence to the significant relationship between exchange rate and stock returns at the higher quantiles for both the finance and insurance sectors, as reported in the initial estimates.

**Chapter Summary**

The chapter began with the descriptive analysis of the study's variables used, which provided an overview of the variables. Next to follow was correlation analysis which was used to assess the degree of association between each of the relevant variable. After the correlation analysis, the main findings were presented in accordance with the objectives of the study. The results were then analysed and discussed in relation to existing literature. The control variables were also discussed afterwards. Lastly, a robustness test was

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conducted and results were presented and discussed. The chapter concluded with a summary of the chapter. The next chapter provides summary, conclusions, as well as, recommendations.

## CHAPTER FIVE

## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

**Introduction**

In the previous chapter, results and discussion of the study were presented. This chapter sums up the entire study on exchange rate and stock returns on Ghana Stock Exchange. A summary of the objectives of the study and the key findings are presented in this chapter. This is followed by the conclusion from the findings and the recommendations.

**Summary of Research**

Exchange rate changes has the potential to limits the profit which adversely affects the wealth of the investor, the future prospects of the firm, as well as, could lead to the total collapse of the stock market. This has led to the increase in the awareness to critically monitor the movement between the currency and stock market. Thus, the study sought to analyse the relationship between exchange rate and stock returns for some selected sectors in Ghana across the different times scales and quantiles.

The study is supported by the international trading effect theory, portfolio adjustment theory, and heterogeneous market hypothesis (HMH) which all states there exist a relationship between exchange rate and stock returns. Furthermore, the study employed the positivism philosophy which allows use of quantitative measures and mathematical models in explaining the relationship between two variables. Based on that, the study adopted the use of bivariate wavelet coherence analysis together with quantile regression model.

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**Summary of Key Findings**

Some intriguing discoveries were made from the results of the study. The study's key objective was to examine the links between exchange rate and sectoral stock returns in Ghana. With regards to the co-movement between the two assets, the study found that there exists a significant co-movement between exchange rate and stock return for each of the sectors across both time and frequency. Further, the findings depict that there exist both positive and negative connections between the two assets, whereby the two assets drive each other in the medium and long term for Food & Beverage sector and Agriculture sector respectively.  Considerably, in the short term, stock returns are seen to be leading, whereas in the medium and long run exchange rate dominates the co-movement.  The study also finds evidence of no lead-lag relationship across the frequency which is very observable in the short and medium term than the long term.

Concerning the effect exchange rate has on stock returns, it was found that exchange rate has a varying influence on stock returns across both quantiles and sectors. However, this effect is only significant (positive) in normal and bullish markets of the finance and insurance sectors. Implying an increase (fall) in the dollar-cedi rates would results in an increase (decline) in stock returns of the finance and insurance sectors. This significant effect in the normal and bullish market can be attributed to the increase in economic activity around such periods, as it leads to international investors remitting more funds into the economy to boost the performance of indigenous firms, and eventually reflects in the returns of these financial providers. The positive effect can be based also on the dolarisation of the Ghanaian economy, which

cause the demand of the dollar to go up relative to the cedi and thus eventually leading to the depreciation of cedi which will cause a rise in stock returns.

**Conclusions**

The analysis of the study's findings yielded the following conclusions. Based on the findings on the co-movement between exchange rate and stock returns across the various time specifications, it can be concluded that the relationship between the two assets revolves with time. The study further concludes that, there exist diversification benefits for investors in the short term than long term. In relation to the effects exchange rate has on stock returns, it could be concluded that exchange rate has significant effect on returns of finance and insurance sector in the normal and bullish markets indicating activities in the non-financial sectors are driven by the finance and insurance sector.

**Recommendations**

Based on the findings and conclusions reached by this study, the following recommendations were made. Firstly, investors should incorporate the time varying aspects of the relationship in their portfolio decision making. For instance, in short and medium term, investors can invest in sectors that are highly performing, whereas, in the long-term investors can invest in sectors that are sensitivity to currency movements (such as multinationals companies, importing & exporting sectors). Secondly, policymakers should consider the time varying relationship between exchange rate and stock returns in formulating and implementing policy that would boost the performance of the Ghanaian stock and currency market. Lastly, in times of market expansion policy makers should formulate economic policies that is geared towards

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stablising and strengthen the Finance and Insurance sectors as they drive economic activities in the other sectors.

**Suggestion for Further Studies**

This study suggests further investigation into the influence of exchange rate fluctuations on the remaining four sectors' returns. Future studies could also consider replicating this study at the firm level since individual firms react differently to changes in exchange rates. The study also suggests the extension of the international trading effect theory and portfolio adjustment to cover multi-dimensional time scales.

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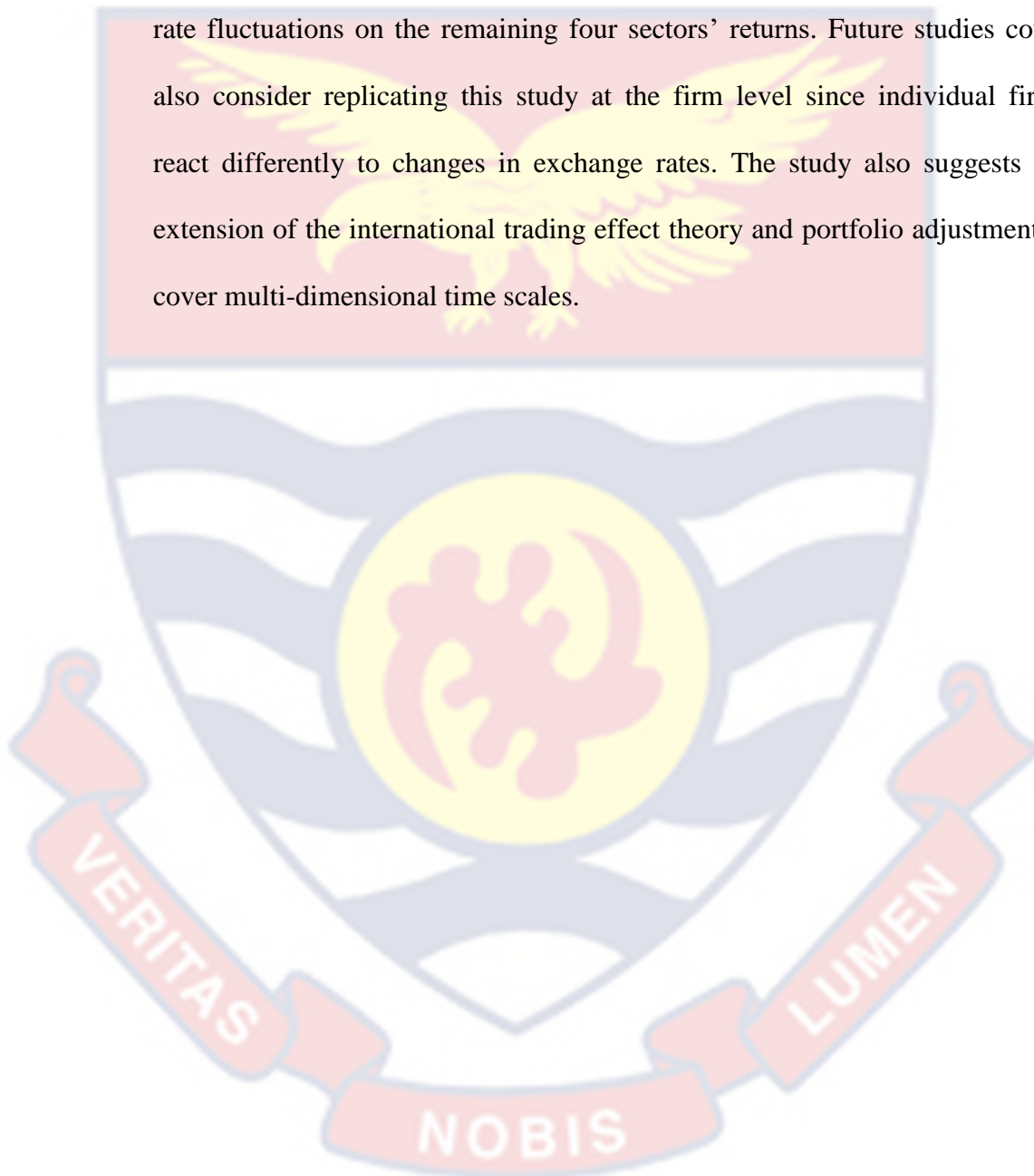
# REFERENCES

Abeka, M. J. (2018). *Trade openness and financial development in sub-Saharan Africa: the role of institutional quality*. Unpublished masters' dissertation, Department of Finance, University of Cape Coast.

Adabor, O., & Buabeng, E. (2022). Asymmetrical effect of exchange rate changes on money demand: Empirical evidence from Ghana. *Journal of Science and Technology (Ghana)*, *40*(2), 131-147.

Adam, M.A. (2015). Statistics for business research. Ghana: *Global Research Publishers*

Adebowale, E. A., & Akosile, A. I. (2018). Interest rate, foreign exchange rate, and stock market development in Nigeria. *Binus Business Review*, *9*(3),  247-253.

Adeniyi, O., & Kumeka, T. (2020). Exchange rate and stock prices in Nigeria: Firm-level evidence. *Journal of African Business*, *21*(2), 235-263.

Adjasi, C. K., Biekpe, N. B., & Osei, K. A. (2011). Stock prices and exchange rate dynamics in selected African countries: A bivariate analysis. *African Journal of Economic and Management Studies*, 2 (2), 143-164.

Aggarwal, R. (1981): Exchange rates and stock prices: a study of U. S. capital market under floating exchange rates. *Akron Business and Economic Review*, 12(1981), 7-12.

Agyei, S. K., Bossman, A., Asiamah, O., & Adela, V. (2022). Exchange rate, COVID-19, and stock returns in Africa: insights from time-frequency domain. *Discrete Dynamics in Nature and Society*, *2022*, 1-20.

Ahmed, W. M. (2020). Asymmetric impact of exchange rate changes on stock returns: Evidence of two de facto regimes. *Review of Accounting and Finance*, 19(2), 147-173.

Alagidede, P., & Ibrahim, M. (2017). On the causes and effects of exchange rate volatility on economic growth: Evidence from Ghana. *Journal of African Business*, *18*(2), 169-193.

Ali, R., Mangla, I. U., Rehman, R. U., Xue, W., Naseem, M. A., & Ahmad, M. I. (2020). Exchange rate, gold price, and stock market nexus: A quantile regression approach. *Risks*, *8*(3), 86-102.

Amtiran, P. Y., Indiastuti, R., Nidar, S. R., & Masyita, D. (2017). Macroeconomic factors and stock returns in APT framework. *International Journal of Economics & Management*, *11(1),97-206*

Andriansyah, A., & Messinis, G. (2019). Stock prices, exchange rates and portfolio equity flows: A Toda-Yamamoto panel causality test. *Journal of Economic Studies*, *46* (2), 399-421.

Archer, C., Junior, P. O., Adam, A. M., Asafo-Adjei, E., & Baffoe, S. (2022). Asymmetric dependence between exchange rate and commodity prices in Ghana. *Annals of Financial Economics*, *17*(02), 2250012 /doi/abs/10.1142/S2010495222500129

Asafo-Adjei, E., Adam, A. M., & Darkwa, P. (2021). Can crude oil price returns drive stock returns of oil producing countries in Africa? Evidence from bivariate and multiple wavelet. *Macroeconomics and Finance in Emerging Market Economies*, 1-19.

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Asafo-Adjei, E., Agyapong, D., Agyei, S. K., Frimpong, S., Djimatey, R., & Adam, A. M. (2020). Economic policy uncertainty and stock returns of Africa: a wavelet coherence analysis. *Discrete Dynamics in Nature and Society*, *2020*.

Asare-Kyere, R. K. (2019). *Effect of exchange rate volatility on stock prices in Ghana*. Unpublished dissertation, Department of Business Administration, Ashesi University College.

Awiagah, R., & Choi, S. S. B. (2018). Predictable or random? -A Test of the weak-form efficient market hypothesis on the Ghana stock exchange. *Journal of Finance and Economics*, *6*(6), 213-222.

Aydin, M., Pata, U. K., & Inal, V. (2021). Economic policy uncertainty and stock prices in BRIC countries: evidence from asymmetric frequency domain causality approach. *Applied Economic Analysis*, *30(89),* 114-129.

Bala Sani, A. R., & Hassan, A. (2018). Exchange rate and stock market interactions: Evidence from Nigeria. *Arabian Journal of Business and Management Review*, *8*(1), 334-339.

Barnes., E. & Tawiah, V. (2015). Seasonality of exchange rates in Ghana. *International Journal of Research in Economics and Social Sciences (IJRESS)*, *5*(3), 1-11**.**

Baur, D. G. (2013). The structure and degree of dependence: A quantile regression approach. *Journal of Banking & Finance*, *37*(3), 786-798.

Boako, G., & Alagidede, P. (2017). Co-movement of Africa's equity markets: Regional and global analysis in the frequency–time domains. *Physica A: Statistical Mechanics and Its Applications*, *468*, 359-380.

Boako, G., Omane-Adjepong, M., & Frimpong, J. M. (2016). Stock returns and exchange rate nexus in Ghana: A Bayesian quantile regression approach. *South African Journal of Economics*, *84*(1), 149-179.

Boateng, J. O. (2019). *The impact of exchange rate fluctuations on firms' financial performance: A case study of some selected manufacturing firms in Ghana.* Unpublished doctoral dissertation, Department of Finance, University of Ghana.

Branson, W., Halttunen, H., & Masson, P. (1977). Exchange rate in the short run: the dollar Deutsche mark rate**.** *European Economic Review*, 10(1977), 303–324.

Buabin, C. P. (2016). *Effect of exchange rate volatility on economic growth in Ghana: An empirical investigation.* Unpublished doctoral dissertation, Department of Finance, University of Cape Coast.

CEIC Data (2021). *Ghana market capitalization: % of GDP.* Retrieved from: https://www.ceicdata.com/en/indicator/ghana/market-capitalization--nominal-gdp

Cheong, C. W., Cherng, L. M., & Yap, G. L. C. (2016). Heterogeneous market hypothesis evaluations using various jump-robust realized volatility. *Romanian Journal of Economic Forecasting*, *19*(4), 51-64.

Chkili, W., & Nguyen, D. K. (2014). Exchange rate movements and stock market returns in a regime-switching environment: Evidence for BRICS countries. *Research in International Business and Finance*, *31*, 46-56.

Coronado, S., Gupta, R., Hkiri, B., & Rojas, O. (2020). Time-varying spillovers between currency and stock markets in the USA: Historical evidence from more than two centuries. *Advances in Decision Sciences*, *24*(4), 1-32.

Creswell, J. W. (2009). Mapping the field of mixed methods research. *Journal of mixed methods research*, *3*(2), 95-108.

Cudjoe, A. (2021). *How Volatile is the Stock Exchange? A Look at the Ghana Stock Exchange.* Unpublished doctoral dissertation, Department of Finance, University of Cape Coast.

Cuestas, J. C., & Tang, B. (2017). Asymmetric exchange rate exposure of stock returns: Empirical evidence from Chinese industries. *Studies in Nonlinear Dynamics & Econometrics*, *21*(4), 1-21.

Dahir, A. M., Mahat, F., Ab Razak, N. H., & Bany-Ariffin, A. N. (2018). Revisiting the dynamic relationship between exchange rates and stock prices in BRICS countries: A wavelet analysis. *Borsa Istanbul Review*, *18*(2), 101-113.

Dar, A. B., Shah, A., Bhanja, N., & Samantaraya, A. (2014). The relationship between stock prices and exchange rates in Asian markets: a wavelet based correlation and quantile regression approach. *South Asian Journal of Global Business Research*, 3(2), 209-224.

Demir, E., & Ersan, O. (2018). The impact of economic policy uncertainty on stock returns of Turkish tourism companies. *Current Issues in Tourism*, *21*(8), 847-855.

Dornbusch, R. & Fischer, S. (1980). Exchange rates and the current account: *American Economic Review*, 70, (5), 960-971

Effiong, E. L., & Bassey, G. E. (2019). Stock prices and exchange rate dynamics in Nigeria: An asymmetric perspective. *The Journal of International  Trade & Economic Development*, *28*(3), 299-316.

Elshqirat, D. (2019). An empirical examination of the arbitrage pricing theory: Evidence from Jordan. *Journal of Studies in Social Sciences, 18(2), 46-67.*

Eyvazi, A., Mojahedi, M. M. M., & Mohammadi, T. (2020). The effect of exchange rate returns on stock returns in various percentiles of the distribution: quantile regression approach.

Fama, E. F. (1991). Efficient capital markets. *The Journal of Finance*, 46(5), 1575-1617.

Frankel, J. A. (1983). Monetary and portfolio-balance models of exchange rate determination. In Bhandari J.S & Putnam, B.H. (eds). *Economic interdependence and flexible exchange rates*. MIT Press: Cambridge.

Gatsi, J. G., Appiah, M. O., & Wesseh Jr, P. K. (2016). Exchange rates and stock  prices in Ghana. *Journal of Applied Business and Economics*, *18*(3), 63-76.

Ghana Stock Exchange Monthly Reports (2022). Retrieved from: https://docs.google.com/viewerng/viewer?url=https://gse.com.gh/wp-content/uploads/2022/11/GSE-Equities-Market-Report-October-2022.pdf

Giri, A.K., & Pooja, J. O. S. H. I. (2017). The impact of macroeconomic indicators on Indian stock prices: An empirical analysis. *Studies in Business & Economics*, *12*(1), 61-78.

Gokmenoglu, K., Eren, B. M., & Hesami, S. (2021). Exchange rates and stock markets in emerging economies: new evidence using the quantile-on-quantile approach. *Quantitative Finance and Economics*, 5(1), 94-110.

Grinsted, A., Moore, J. C., & Jevrejeva, S. (2004). Application of the cross wavelet transform and wavelet coherence to geophysical time series. *Nonlinear Processes in Geophysics*, *11*(6), 561-566.

Gu, G., Zhu, W., & Wang, C. (2022). Time-varying influence of interest rates on stock returns: evidence from China. *Economic Research-Ekonomska Istraživanja*, *35*(1), 2510-2529.

Harb Sayed Ahmed, N. (2019). Exchange rate volatility and tourism stock prices: Evidence from Egypt. *Journal of Association of Arab Universities for Tourism and Hospitality*, *17*(2), 55-68.

Hung, N. T. (2020). Stock market volatility and exchange rate movements in the Gulf Arab countries: A Markov-state switching model. *Journal of Islamic Accounting and Business Research*, *11(9),* 1969-1987.

Insaidoo, M., Arthur, L., Amoako, S., & Andoh, F. K. (2021). Stock market performance and COVID-19 pandemic: evidence from a developing economy. *Journal of Chinese Economic and Foreign Trade Studies*, *14 (1),* 60-73.

Jeon, J. H. (2020). Macro and non-macro determinants of Korean tourism stock performance: A quantile regression approach. *The Journal of Asian  Finance, Economics and Business*, *7*(3), 149-156.

Jeon, B. N., Zheng, D., & Zhu, L. (2017). Exchange rate exposure: International evidence from daily firm-level data. *Journal of Economic Integration*, 112-159.

Junior, P. O., Tiwari, A. K., Padhan, H., & Alagidede, I. (2020). Analysis of EEMD-based quantile-in-quantile approach on spot-futures prices of energy and precious metals in India. *Resources Policy*, *68*, 101731.

Kang, S. H., McIver, R. P., & Hernandez, J. A. (2019). Co-movements between bitcoin and gold: A wavelet coherence analysis. *Physica A: Statistical Mechanics and its Applications*, *536*, 120888.

Kerlinger, F. N., Lee, H. B., & Bhanthumnavin, D. (2000). Foundations of behavioral research: The most sustainable popular textbook by Kerlinger & Lee (2000). *Journal of Social Development*, *13*, 131-144.

Khan, M. K. (2019). Impact of exchange rate on stock returns in Shenzhen stock exchange: Analysis through ARDL approach. *International Journal of Economics and Management*, *1*(2), 15-26.

Khochiany, R. (2018). The time-scale interactions between stock price and exchange rate volatility in Tehran stock exchange. *Financial Management  Strategy*, *6*(2), 168-191.

Koenker, R., & Hallock, K. F. (2001). Quantile regression. *Journal of economic perspectives*, *15*(4), 143-156.

Koenker, R., & Basset, G. (1978). Asymptotic theory of least absolute error regression. *Journal of the American Statistical Association*, *73*(363), 618-   622.

Korley, M., & Giouvris, E. (2021). The regime-switching behaviour of exchange rates and frontier stock market prices in Sub-Saharan Africa. *Journal of Risk and Financial Management*, *14*(3), 122- 152.

Kothari, C. R. 2009. *Research methodology – methods and techniques*. New Delhi: Wiley eastern Limited

Kwofie, C., & Ansah, R. K. (2018). A study of the effect of inflation and exchange rate on stock market returns in Ghana. *International Journal of Mathematics and Mathematical Sciences*, 2018, 1-8.

Liu, C., & Rubin, D. B. (1994). The ECME algorithm: a simple extension of EM and ECM with faster monotone convergence. *Biometrika*, *81*(4), 633-648.

Lo, A. W. (2004). The adaptive markets hypothesis. *The Journal of Portfolio Management*, *30*(5), 15-29.

Madaleno, M., & Pinho, C. (2012). International stock market indices comovements: A new look. *International Journal of Finance & Economics*, *17*(1), 89-102.

Mahapatra, S., & Bhaduri, S. N. (2019). Dynamics of the impact of currency fluctuations on stock markets in India: Assessing the pricing of exchange rate risks. *Borsa Istanbul Review*, *19*(1), 15-23.

Makori, N. G. (2017). *The effect of exchange rate changes on stock market returns at the Nairobi Securities Exchange.* Unpublished dissertation, Department of Finance and Accounting, University of Nairobi.

Mensah, J. T., Adom, P. K., & Pomaa-Berko, M. (2014). Does automation improve stock market efficiency in Ghana?. *African Review of Economics and Finance*, *6*(1), 69-101.

Mishra, S. (2016). The quantile regression approach to analysis of dynamic interaction between exchange rate and stock returns in emerging markets: case of BRIC nations. *IUP Journal of Financial Risk Management*, *13*(1), 7-27.

Moagăr-Poladian, S., Clichici, D., & Stanciu, C. V. (2019). The comovement of exchange rates and stock markets in Central and Eastern Europe. *Sustainability*, *11*(14), 3985.

Morlet, J., Arens, G., Fourgeau, E., & Glard, D. (1982). Wave propagation and sampling theory—Part I: Complex signal and scattering in multilayered   media. *Geophysics*, *47*(2), 203-221.

Mroua, M., & Trabelsi, L. (2020). Causality and dynamic relationships between exchange rate and stock market indices in BRICS countries: Panel/GMM and ARDL analyses. *Journal of Economics, Finance and Administrative Science*, *25*(50), 395-412.

Mouna, A., & Anis, J. (2015). A study on small investors' sentiment, financial literacy and stock returns: Evidence for emerging market. *International Journal of Accounting and Economics Studies*, *3*(1), 10-19.

Muhammad, S., Bhatti, G. A., & Raheman, A. (2020). Modelling Stock prices and exchange rates during turbulent periods: new insights from multivariate GARCH parameterizations. *NUML International Journal of Business & Management, 15*(2),1-16.

Müller, U. A., Dacorogna, M. M., Davé, R. D., Pictet, O. V., Olsen, R. B., & Ward, J. R. (1993). Fractals and intrinsic time: A challenge to econometricians. *Unpublished manuscript, Olsen & Associates, Zürich, 130*.

Musawa, N., & Mwaanga, C. (2017). The impact of commodity prices, interest rate and exchange rate on stock market performance: evidence from Zambia. *Journal of Financial Risk Management*, *6*(03), 300-314.

80

Naseer, M. M., Khan, M. A., Popp, J., & Oláh, J. (2021). Firm, industry and macroeconomics dynamics of stock returns: a case of Pakistan non-financial sector. *Journal of Risk and Financial Management*, *14*(5), 1-18.

Nkoro, E., & Uko, A. K. (2016). Exchange rate and inflation volatility and stock   prices volatility: Evidence from Nigeria, 1986-2012. *Journal of Applied Finance and Banking*, *6*(6), 57-70.

Nordin, N., Nordin, S., & Ismail, R. (2014). The impact of commodity prices, interest rate and exchange rate on stock market performance: An empirical analysis from Malaysia. *Malaysian Management Journal*, *18*, 39-52.

Ofori-Abebrese, G., Baidoo, S. T., & Osei, P. Y. (2019). The effect of exchange rate and interest rate volatilities on stock prices: Further empirical evidence from Ghana. *Economics Literature*, *1*(2), 117-132.

Okereke, U. (2017). Foreign exchange rate dynamics and manufacturing firms' performance in Nigeria. *Journal of Economics and Finance, 8(01), 52-58.*

Onyango, A. O. (2018). *Exchange rate volatility and stock prices of companies listed on Nairobi Securities Exchange, Kenya.* Unpublished thesis   Department of Finance. Kenyatta University.

Owusu Junior, P., Kwaku Boafo, B., Kwesi Awuye, B., Bonsu, K., & Obeng-Tawiah, H. (2018). Co-movement of stock exchange indices and exchange rates in Ghana: A wavelet coherence analysis. *Cogent Business & Management*, *5*(1), 1481559. Retrieved from:

https://www.tandfonline.com/doi/full/10.1080/23311975.2018.148155 9

Parsva, P., & Tang, C. F. (2017). A note on the interaction between stock prices and exchange rates in Middle-East economies. *Economic research-Ekonomska istraživanja*, *30*(1), 836-844.

Qureshi, S., Qureshi, F., Soomro, A. B., Chandio, F. H., Shah, S. S., & Rehman, I U. (2022). Exchange rate risk and sectoral returns: A wavelet-based MRA-EDCC GARCH analysis. *Communications in Statistics Theory and Methods*, *51*(7), 2154-2182.

Raraga, F., & Muharam, H. (2014). VAR analysis on mutual relationship between stock price index and exchange rate and the role of world oil price and world gold price. In *11th International Annual Symposium on Management, Batu, East Java, Indonesia*. Available at SSRN: https://ssrn.com/abstract=2470184 or http://dx.doi.org/10.2139/ssrn.2470184

Ross, S. A. (1976). The arbitrage theory of capital asset pricing**.** *Journal of Economic Theory***,** 13, 341-360

Rua, A., & Nunes, L. C. (2009). International comovement of stock market returns: A wavelet analysis. *Journal of Empirical Finance*, *16*(4), 632-639.

Saidi, L. O., Muthalib, A. A., Adam, P., Rumbia, W. A., & Sani, L. O. A. (2021). Exchange rate, exchange rate volatility and stock prices: An analysis of the symmetric and asymmetric effect using ardl and nardl models. *Australasian Accounting, Business and Finance Journal*, *15*(4), 179-190.

82

Saunders, M., Thornhill, A. & Lewis, P. (2009). *Research methods for business Students*. (5th ed0. Italy: Prentice Hall.

Shinkeva, L. M. (2020). *The effect of exchange rate risk on stock market returns at the Namibia stock exchange.* Unpublished doctoral dissertation. Department of Finance and Accounting, University of Namibia.

Suhadak, S., & Suciany, A. D. (2020). Brief technical note: the influence of exchange rates on inflation, interest rates and the composite stock price index: Indonesia 2015-2018. *Australasian Accounting, Business and Finance Journal*, *14*(1), 105-120.

Tekin, B., & Hatipoğlu, M. (2017). The effects of VIX index, exchange rate & oil prices on the BIST 100 index: A quantile regression approach. *ODÜ Sosyal Bilimler Araştırmaları Dergisi (ODÜSOBİAD), 7*(3), 627-634

Tiwari, A. K., Bhanja, N., Dar, A. B., & Olayeni, O. R. (2015). Analyzing time– frequency-based co-movement in inflation: evidence from G-7 countries. *Computational Economics*, *45*(1), 91-109.

Torrence, C., & Compo, G. P. (1998). A practical guide to wavelet analysis. *Bulletin of the American Meteorological Society*, *79*(1), 61-78.

Tripathi, V., & Kumar, A. (2015). Do macroeconomic variables affect stock returns in BRICS markets? An ARDL approach. *Journal of Commerce & Accounting Research*, *4*(2), 647-658.

Tweneboah, G., Junior, P. O., & Kumah, S. P. (2020). Modelling the asymmetric linkages between spot gold prices and African

stocks. *Research in     International Business and Finance*, *54*, 101246.

Available at:    https://doi.org/10.1016/j.ribaf.2020.101246

Tweneboah, G., Junior, P. O., & Oseifuah, E. K. (2019). Integration of major African stock markets: evidence from multi-scale wavelets correlation. *Academy of Accounting and Financial Studies Journal*, *23*(6),1-15.

Yonga, R. (2014*). Ghana stock exchange performance review of year to 2013*. Retrieved from: https://www.african-markets.com/en/stock-markets/gse/ghana-stock-exchange-performance-review-of-year-2013

Živkov, D., Balaban, S., & Djurašković, J. (2018). What multiscale approach can tell about the nexus between exchange rate and stocks in the major emerging markets? *Finance a Uver*, *68*(5), 491-512.