T.C.
SAKARYA UNIVERSITY
INSITUTION OF SOCIAL SCIENCES
DEPARTMENT OF ISLAMIC ECONOMIC AND FINANCE

THE EFFECT OF GLOBAL AND LOCAL MACROECONOMIC FACTORS ON STOCK MARKET IN SUDAN

Isra FAGIR

MASTER'S THESIS

Supervisor: Prof. Dr. Şakir GÖRMÜŞ

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"This thesis was defended hybrid on 20/01/2023 and was unanimously accepted by the jury members whose names are listed below."

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Isra FAGIR
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CONTENTS

ii

ABBREVIATIONS

EX	**:**	Exchange Rate
KSE	**:**	Khartoum Stock Market Index
EN	**:**	Inflation Rate
MR	**:**	Murabaha
OVX	**:**	Oil Price Volatility
VIX	**:**	Chicago Board Options Exchange (CBOE) Volatility Index
CAPM	**:**	The Capital Asset Pricing Model
APT	**:**	The Arbitrage Pricing Theory
MENA	**:**	North Africa and the Middle East
GMCs	**:**	Government Musharaka Certificates
SDG	**:**	Sudanese Pounds
GARCH	**:**	The Generalised Conditional Heterogeneous Regression
OLS	**:**	Ordinary Least Squares
VAR	**:**	The Vector Auto Regression
COP	**:**	Crude Oil Price
CBS	**:**	The Central Bank of Sudan
PCE	**:**	Measurement Consumption Expenditures
EXR	**:**	Exchange Rate Stability
GLS	**:**	Generalized Least Squares
PP	**:**	Phillips and Perron
VECM	**:**	Vector Error Correction Model
BRICS	**:**	Brazil, Russia, India, China, and South Africa
WTI	**:**	West Texas Intermediate
QR	**:**	The Quantile Regression

LIST OF TABLES

LIST OF GRAPH

ABSTRACT

Title of Thesis: The Effect of Local and Global Macroeconomic Factors on Stock Market In Sudan

Author of Thesis: Isra FAGIR

Supervisor: Prof. Dr. Şakir GÖRMÜŞ

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This study aimed to examine the impact of global and local macroeconomic factors on the stock market in Sudan using quantile regression methodology for the period 2007 to 2018. The results indicated that the Khartoum stock market returns were influenced by global factors such as the VIX before the separation of Sudan in 2011, while after the separation, the returns were more influenced by local factors including the Murabaha rate, exchange rate, and inflation. The exchange rate was found to have a significant positive impact on the stock market in the second period, while the inflation rate was found to have a significant positive impact as well. On the other hand, the Murabaha rate and OVX were found to have a significant impact in the second period, while they were insignificant in the first period. The VIX was found to have a negative significant impact on the stock market in the second period, while it was insignificant in the first period. These findings suggest that the separation of Sudan in 2011 changed the performance and sensitivity of the Khartoum stock market to different factors and have implications for investors and mark participants.

Keywords: Domestic Macroeconomic Factors, Global Factors, Quantile Regression

ÖZET	
Başlık: Sudan'da Yerli ve Küresel Makroekonomik Faktörlerin Borsa Üzerindeki Etkisi	
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Bu çalışma, 2007 ile 2018 yılları arasında Sudan'da global ve yerel makroekonomik faktörlerin stok piyasası üzerindeki etkisini kantil regresyon metodolojisi kullanarak incelemek amacıyla yapılmıştır. Sonuçlar, 2011 yılında Sudan'ın ayrılmasından önce VIX gibi global faktörlerin, ancak ayrılmadan sonra Murabaha oranı, döviz kuru ve enflasyon gibi yerel faktörlerin Khartoum stok piyasası getirilerini etkilediğini göstermiştir. İkinci dönemde döviz kuru stok piyasası üzerinde anlamlı pozitif bir etkiye sahip bulunurken, enflasyon oranı da anlamlı pozitif bir etkiye sahiptir. Diğer taraftan, Murabaha oranı ve OVX ikinci dönemde anlamlı bir etkiye sahip bulunurken, ilk dönemde anlamsız bulunmuştur. VIX, ikinci dönemde stok piyasası üzerinde negatif anlamlı bir etkiye sahip bulunurken, ilk dönemde anlamsız bulunmuştur. Bu bulgular, Sudan'ın 2011 yılında ayrılmasının Khartoum stok piyasasının performansını ve farklı faktörlere duyarlılığını değiştirdiğini ve yatırımcılar ve piyasa katılımcıları için sonuçları olduğunu göstermektedir.

Anahtar Kelimeler: Yerli Makroekonomik Faktörler, Küresel Ekonomik Faktörler, Kvantil Regresyon

INTRODUCTION

The concept of financial integration has gained traction in recent years due to globalization, as it offers advantages to business owners, venture capitalist, and economic actors. Financial integration refers to the close connection between a country's financial market and the global financial market, as noted by Fouls (2004). Financial integration can provide investors with greater access to a diverse range of investment opportunities and can enhance the efficiency of resource allocation. However, it's important to note that stocks in all markets are subject to the same types of risks, and the risk premiums across markets are generally similar. As a result, the international integration of national stock markets can provide local and foreign investors with greater diversification opportunities. This integration can also impact the management of international portfolios and the allocation of capital across markets, as highlighted by Narayan et al (2014) and Bahloul ,Ben Amor(2021).

There are two main theories that aim to predict the relationship between stock market returns and economic factors: the capital asset pricing model (CAPM) and the arbitrage pricing theory (APT). According to price-based metrics, if markets are integrated, the prices and returns of financial assets of the same class should be the same regardless of the country in which the transaction takes place. This represents the power of arbitrage. It is important to understand the relationship between expected returns and associated risks in order to determine the benefits that investors may realize. However, measuring the risks of investing in emerging markets stocks can be more complex than in developed markets. According to Al-Mohamed et al (2018), emerging markets are often partially fragmented, meaning that the process of financial integration is gradual and reversible. When stock markets are partially segmented, investors face risks and prices that are specific to each country. In this case, expected returns must be determined by considering both local and global risk sources. The relative importance of global versus local factors in explaining a country's stock market returns determines the level of financial integration. Maghyereh et al (2015) conducted a study on the equity returns and volatility shared between the US and the Middle East before and after the global financial crisis of 2008 and found that local factors are a significant source of return variance in these markets. According to research by Maghyereh et al (2015), the relationship between the

US and the Middle East in terms of equity returns and volatility was weak and insignificant prior to the global financial crisis but became significantly stronger after the crisis. The authors suggest that this change in the relationship structure was particularly pronounced during times of stress, with the US market having a greater influence on the Middle East. Hammoudeh & Li (2008) conducted a study on sudden changes in volatility in five Arab stock markets in the Gulf region and found that most of these markets were more sensitive to global events than to local and regional factors. They also found that the stock exchanges of Egypt, Morocco, and Tunisia had matured and had become financially integrated with global stock markets. International to examine the degree of financial integration in MENA countries during the pre-crisis period January 2000 to December 2007 and the post-crisis period January 2008 to October 2015. They found that the degree of integration increased in the post-crisis period, due in part to the alignment of MENA markets with international financial markets and the liberalization of national financial markets by governments in the region. These policies aimed to increase the proportion of foreign participation in MENA markets through trade and ownership activities. The study also found that the degree of integration between the Middle East and North Africa region, the United States, and the United Kingdom was greater in the post-crisis period than in the pre-crisis period(Bahloul & Ben Amor, 2021).

This study aims to investigate the relative importance of global and local macroeconomic factors in influencing the returns of the stock market in Sudan. This is important for determining the level of financial integration of Sudan's markets with international markets. Sudan is an interesting case study due to its diverse natural resources and its history of political and economic crises, including the emergence of oil and the transformation of Sudan from an oil exporter to an importer after the secession of South Sudan.

After South Sudan seceded from Sudan in 2011, the economic and financial situation in Sudan has been challenging. The country lost a significant portion of its oil reserves and foreign exchange earnings, which had a significant impact on its economy. The government has struggled to maintain its currency and stabilize its inflation rate, which reached unprecedented levels in 2018. In an effort to address these challenges, the government has pursued economic reforms, including floating the Sudanese pound and implementing austerity measures. However, these efforts have been hindered by ongoing

2

conflicts and sanctions imposed by the international community, which have limited the country's access to international financing and investment. The oil sector has also been affected by the separation, with a significant decline in oil production and exports. The government has sought to attract investment in the sector and increase production, but the ongoing conflict and sanctions have made this challenging.

Overall, the economic and financial situation in Sudan remains challenging, and sustained progress will likely depend on the resolution of ongoing conflicts, the lifting of sanctions, and the successful implementation of economic reforms The stock market in Sudan is also relatively understudied compared to other emerging markets in Africa. The economic and financial situation in Sudan has been challenging since the separation of South Sudan in 2011, as the country has lost a significant portion of its oil reserves and foreign exchange earnings. The government has struggled to maintain its currency and stabilize its inflation rate, which reached unprecedented levels in 2018. These challenges have had far-reaching implications for the overall economy making it difficult for the government to create a supportive environment for growth One of the key measures that the government has taken to address these challenges is the implementation of economic reforms.

The reforms have included the floating of the Sudanese pound, which was previously pegged to the US dollar, and the introduction of austerity measures to help control inflation. However, these efforts have been impeded by ongoing conflicts within the country, as well as sanctions imposed by the international community. These sanctions have limited Sudan's access to international financing and investment, making it more difficult for the government to carry out its reforms and to create a stable and supportive environment for economic growth.

In addition to the challenges posed by ongoing conflict and international sanctions, the oil sector in Sudan has also been affected by the separation of South Sudan. The decline in oil production and exports has had a significant impact on the country's economy, and the government has sought to attract investment in this sector to help increase production and support the overall economy. Despite these efforts, the ongoing conflict and sanctions have made it difficult for Sudan to attract the investment that it needs to grow its oil sector and support its broader economy Another issue that Sudan has faced is a lack of

diversification in its economy. With a heavy reliance on oil production and exports, the country has been vulnerable to fluctuations in the global oil market.

To address this issue, the government has been working to diversify the economy, by promoting investment in other sectors, including agriculture, tourism, and manufacturing. However, these efforts have been hindered by the ongoing conflict and sanctions, which have limited the country's access to investment and financing. The government has also been working to address the issue of corruption, which has long been a major problem in Sudan. Corruption has had a significant impact on the country's economy, undermining investor confidence and stifling economic growth. The government has taken steps to address this issue, including the introduction of anti-corruption measures and the creation of anti-corruption agencies. However, more needs to be done to fully address the issue, and to restore trust in the government and the economy in terms of the financial sector, Sudan has faced significant challenges, including a lack of access to international financing and investment. This has made it difficult for the government to implement its economic reforms, and to support the overall economy. The government has been working to address this issue, by seeking to establish closer ties with international financial institutions, and by promoting investment in the financial sector. However, the ongoing conflict and sanctions have made it difficult for the government to achieve these goals.

Despite these challenges, there is hope that the economic and financial situation in Sudan will improve in the coming years. However, sustained progress will likely depend on several factors, including the resolution of ongoing conflicts, the lifting of international sanctions, and the successful implementation of economic reforms. The government will need to work closely with the international community to create a supportive environment for economic growth, and to encourage investment and foreign direct investment into the country in conclusion, the separation of South Sudan from Sudan has had a profound impact on the latter country's economy and finances.

Despite efforts by the government to address these challenges, including the implementation of economic reforms and the attraction of investment, the ongoing conflict and sanctions have made it difficult for Sudan to achieve sustained progress. However, by working closely with the international community, and by resolving the

conflicts and lifting the sanctions. Additionally, the stock exchanges in the MENA region have experienced significant volatility and there have been ongoing efforts to promote financial development in the region.

By examining the factors influencing the stock market in Sudan, this study adds to the understanding of financial integration in Africa and the MENA region. Also, to investigate the influence of both domestic and international macroeconomic factors on the stock market in Sudan over a prolonged period, including the global financial crisis and the December revolution. The researchers will use a scale to examine how the effects of explanatory variables differ across different market periods. To the best of our knowledge, no previous studies have examined the impact of these factors on stock market returns in Sudan or Africa across different systems. By using a quantile regression approach, we hope to gain insights into the combined movements in bear, bull, and average market states.

In addition, this study aims to determine whether the relative effects of macroeconomic and global factors vary in explaining returns across the stock market in Sudan.

By examining the Sudanese case, this study aims to contribute to the literature by exploring the asymmetry in the relationship between exchange rates and stock prices in an emerging market context. It also aims to provide insights for policymakers and investors on the potential impacts of exchange rate movements on the stock market.

The purpose of this study is to examine the impact of local (exchange rate, inflation and Murabaha rate) and global macroeconomic factors (oil price volatility and fear indeks VIX) on stock markets in Sudan in two time periods from 2007 till 2011 before Sudan separation and second period from 2011 till 2018 after Sudan separation. To achieve this goal, this research is structured into five chapters. The first chapter introduces the topic and sets out the research questions and objectives, as well as highlighting the importance of the study. The second chapter offers a comprehensive literature review, examining both theoretical and empirical studies of local and global macroeconomic factors. The third chapter details the data overview and introduces the quantile methodology used in the analysis. The fourth chapter presents the results of the study, while the fifth chapter concludes with a discussion of the limitations of the research, along with recommendations for future research directions.

Aim of the Study

The aims of the research are first the Employing the quantile regression methodology to find out if the local economic factors represented in the exchange rate, inflation, and Murabaha returns if they affect the Sudanese stock market or not prior to and following the secession of Sudan from South Sudan. Second, Employing the quantile regression methodology to verify the magnitude of the impact of global factors such as fluctuations in oil prices volatility and the VIX on the performance of the Sudanese the stock market before and after the secession of Sudan from South Sudan.

Objectives

Ascertaining the impact of the currency on the stock market in Sudan

Demonstrating the impact of inflation on the stock market in Sudan

Establishing the impact of the rate of the Murabaha on the stock market in Sudan

Demonstrating the impact of oil prices volatility on the stock market in Sudan

Verifying the development of the Chicago index on the stock market in Sudan

Research Questions

Is the Sudanese stock market affected by the exchange rate

What effect does Sudan's inflation rate have on the stock market

Does oil price fluctuation affect the stock market in Sudan

What is the effect of Murabaha as a financing method in the stock market in Sudan

Method of the Study

To investigate this relationship, the researcher uses quantile regression, Quantile regression can be useful when the distribution of the response variable is not known symmetrical or is otherwise not well-described by the mean. By estimating the conditional median, Quantile regression can provide a more complete picture of the relationship between predictor variables and response variables, especially at different points along the response variable's distribution. The quantile regression developed by Koenker (1978).

Subject of the Study

After South Sudan seceded from Sudan in 2011, the economic and financial situation in Sudan has been challenging. The country lost a significant portion of its oil reserves and foreign exchange earnings, which had a significant impact on its economy. The purpose of this study is to examine the impact of local (exchange rate, inflation and Murabaha rate) and global macroeconomic factors (oil price volatility and fear indeks VIX) on stock markets in Sudan in two time periods from 2007 till 2011 before Sudan separation and second period from 2011 till 2018 after Sudan separation.

Importance of Study

The economic changes and political challenges that the Sudanese economy has gone through and continues to go through from before the secession of Sudan and after the secession is regarded as one of the most critical economic issues cases in Africa that may be of interest to scientists in the emerging financial markets in Africa and other developing countries that can be affected by economic factors local aggregate or some local factors Some of them also interact with global factors. The importance of this research or study lies so even though it will be the first study to use the quantile regression methodology on three levels to assess the exchange's impact rate, inflation, exports, imports, and the return of the Murabaha formula as Sudan's stock market is influenced by local factors. The study also covers the effect of fluctuations in oil prices and the Chicago index as global factors on the Sudanese stock market.

CHAPTER 1: THE LITERATURE REVIEW

Study used exchange rate (EX), inflation (IN) and Murabaha rate (MR) as a local variables and oil price volatility (OVX) and fear index (VIX) as a global variable.

1.1. Local Macroeconomic Variables

First theorical relationship between selected macroeconomic variable and stock return explain then empirical literature representant.

1.1.1. Exchange Rate

The relationship between exchange rates and stock markets has been the subject of much research and debate in the academic literature. Generally, the literature suggests that there is a positive relationship between exchange rates and stock markets, such that an appreciation of the domestic currency (i.e., a strengthening of the exchange rate) is associated with higher stock prices.

One theory that explains this relationship is the purchasing power parity (PPP) theory, which posits that changes in exchange rates should be reflected in changes in the relative prices of goods and services in different countries. According to PPP theory, a stronger domestic currency should lead to an increase in the relative prices of domestic goods and services, which should in turn increase demand for domestic stocks (Froot and Frankel, 1989).

Another theory that has been used to explain the relationship between exchange rates and stock markets is the portfolio balance theory. This theory suggests that changes in exchange rates can affect the relative attractiveness of domestic and foreign assets, which can in turn affect the demand for domestic stocks. According to this theory, a stronger domestic currency should make domestic assets relatively less attractive to foreign investors, leading to a decrease in demand for domestic stocks (Ito and Rose, 2000).

Also, effect of exchange rate on stock return depends on structure of stock market. If stock market export dominated (import dominated) there will be positive (negative) relationship between two variables.

Basher et al. (2012) investigate the dynamic relationship between the stock returns and exchange rate by utilizing impulse responses function calculated in two ways, standard

and the recently developed projection-based methods. The data used in this study is monthly and covers the sample period from January 1988 to 2008. The model supports established facts such as positive shocks tend to depress emerging market stock prices and US dollar exchange rates in the short run. Additionally, the model captures other stylized facts.

Zhao (2010) undertakes an empirical examination of the dynamic correlation between the Renminbi (RMB) real effective exchange rate and stock valuations, utilizing both Vector Autoregression (VAR) and multivariate Generalized Autoregressive Conditional Heteroskedasticity (GARCH) models. The data employed was monthly and spans from January 1991 to June 2009. The findings of the study reveal that there is not a steady long-term equilibrium relationship between RMB real effective exchange rate and stock prices, furthermore, no mean transference was observed between the foreign exchange and stock markets.

Mahapatra & Bhaduri (2019) undertake an examination of the correlation between stock returns and fluctuation of foreign exchange rate during the period 2005-2016, with a special emphasis on the time before and after financial crises. Utilizing a two-factor arbitrage pricing model, with a random coefficient model, the paper presents evidence of stock returns reacting significantly to foreign exchange rate fluctuations in the post-crisis period. Specifically, throughout the last four years of the sample period 2012-2016, the exchange rate risk factor becomes a prominent determinant of stock returns, signifying that Indian investors are increasingly requiring a premium for their additional exposure to exchange rate risk. This is further affirmed by the study's finding that industries with higher foreign exchange exposure, as measured by trade balance (net inflows), have higher sensibility to exchange rate risk.

Mlambo et al.(2013) evaluate the ramifications of currency volatility on the Johannesburg Stock Exchange (JSE). An empirical model was specified and the Generalized Autoregressive Conditional Heteroskedascity (GARCH) model was employed to establish the correlation between exchange rate volatility and stock market performance. Using monthly data from 2000-2010, the study found a very weak relationship between currency volatility and the stock market. The prime overdraft rate, total mining production and US interest rates were found to influence market

capitalization. The study suggests that the South African government can use exchange rate as a policy tool to attract foreign portfolio investment, as the JSE can be marketed as a safe market for foreign investors. However, caution is advised regarding the spill overs from the foreign exchange rate into the stock market.

Kwofie & Ansah (2018) investigate the impact of exchange rate on stock market returns in Ghana, by employing monthly data of exchange rate , and market returns computed from the GSE all-share index, spanning from January 2000 to December 2013. To examine this relationship, the study utilized the Autoregressive Distributed Lag (ARDL) cointegration technique and the Error Correction parametrization of the ARDL model. The analysis was done by utilizing the ARDL and its corresponding error correction model to establish the long- and short-run correlation between the Ghana Stock Exchange (GSE) market returns and exchange rate. The results of the study revealed a significant long- and short-run correlation between GSE market returns and exchange rate. Furthermore, the study examined the presence of long memory property in these variables, and it was observed that it does exist, making it an advantageous feature for investors to take advantage of.

Adaramola (2012) examines the long-term and short-term volatility of exchange rate on the development of stock market in Nigeria, spanning from 1985:1 to 2009:4. The study employs the Johansen cointegration tests to establish a bivariate model and the empirical findings imply a significant positive correlation of stock market performance in relation to exchange rate in the short-term, and a significant negative correlation of stock market performance in relation to exchange rate in the long-term. The Granger causality test presents strong evidence that the causality runs from exchange rate to stock market performance, thus indicating that variations in the Nigerian stock market are explicated by the volatility of exchange rate.

Charles et al.(2008) analyse the relationship between Stock Markets and Foreign Exchange market in Ghana, by using Exponential Generalised Autoregressive Conditional Heteroskedascity (EGARCH) model to establish the relationship between exchange rate volatility and stock market volatility. The study found that there is a negative relationship between exchange rate volatility and stock market returns.

Mok (1993) aims to determine the relationship between the exchange rate and stock prices in Hong Kong by utilizing the ARIMA approach and testing the causality using Granger causality tests, over the time period 1986 to 1991. The results of the study revealed that, depending on the sub-periods examined, there was weak bidirectional causality between stock prices and exchange rate. However, the overall findings indicate that the Hong Kong market efficiently incorporated exchange rate information into its stock prices changes, both at market close and open.

AbdulRahman & Adamu (2018) analyze the relationship between exchange rates and stock market in Nigeria over the period of 1985 to 2015 using Autoregressive Distributed Lag (ARDL) model and Granger causality tests. The study found that exchange rate had a positive and statistically significant impact on stock market. The causality tests revealed unidirectional causality running from exchange rate to stock market. The study recommends that policymakers should ensure effective implementation of monetary policies and devise ways to harmonize monetary and fiscal policies to maintain stable exchange rate and avoid structural breaks that affect the stock market.

Zarei et al.,(2019) examines the correlation between exchange rate and stock market performance in several nations with freely floating exchange rate systems. By utilizing a parity and asset pricing theoretical framework within a monetary-cum-economics perspective of international asset pricing, monthly data from February 1999 to March 2016 is analysed. A system of seemingly unrelated regression is implemented to control for unobserved heterogeneity and cross-sectional dependency. The findings demonstrate a statistically meaningful effect of exchange rate on stock market returns across the selected nations, which aligns with the arbitrage pricing approach of the international capital asset pricing model proposed by Solnik (1992).

Mgammal (2012)The objective of this examination is to determine the correlation, if any, between stock prices and exchange rates. Both short-term and long-term connections between these variables are explored. Using monthly and quarterly data from January 2008 to December 2009, this study examines two Gulf states, the Kingdom of Saudi Arabia (KSA) and the United Arab Emirates (UAE). The results of this study reveal that, in the short-term, the exchange rate has a positive impact on the stock market price index in the UAE, but no correlation is found in KSA. Additionally, the long-term analysis

illustrates that the exchange rate has a negative influence on the stock market price index in the UAE, while again, no correlation is found in KSA.

1.1.2. Inflation Rate

Inflation and stock market performance have been extensively studied in the academic literature, with theories such as the "Fisher effect," proposed by economist Irving Fisher in 1930, stating that an increase in inflation can lead to a decrease in stock prices due to the increase in nominal interest rates. However, empirical evidence has shown that the relationship between inflation and stock market performance is complex and multifaceted, with both positive and negative effects observed depending on the specific context and time under examination, for example, stock prices can increase during periods of high inflation if investors believe that a period of high inflation will be followed by a period of economic growth. Another theory that has been proposed is the "wealth effect" which suggests that when inflation erodes the purchasing power of cash and fixed-income investments, investors may turn to stocks to preserve their wealth. This increased demand for stocks can drive up stock prices.

Ahmed (2020) seeks to assess the correlation between the inflation rate in Sudan and stock returns on the Khartoum Stock Exchange. Utilizing the linear autoregressive distributed lag (ARDL) model, this study examines monthly data over the period from September 2003 to December 2019, while also considering the influence of exchange and money supply growth rates, as well as Murabaha profit margin as control variables. This research aims to fill a gap in existing literature by utilizing the ARDL approach to investigate the relationship between inflation and stock returns. The findings indicate that inflation rate exerts a notably negative impact on stock returns in both the short-term and long-term, which is of paramount importance for the comprehension of economies, particularly developing economies such as Sudan. Consequently, policymakers must implement strategies to curb inflation and stabilize the stock market, and investors must take these findings into account when making short- and long-term investment decisions.

Apergis & Eleftheriou (2002) investigate the relationship between stock prices, inflation, and interest rates in Greece over the period of 1988 to 1999 using daily data. The objective of the study is to examine whether stock prices are more closely associated with inflation or interest rate movements during the period of declining inflation and interest rates. A

reduction of inflation rate expected to contribute to a more substantial increase in stock markets prices.

Bekaert & Engstrom (2010) examine the relationship between stock prices and inflation in US post-war period. The study uses a VAR methodology and measures of inflation expectations and proxies for rational variation in risk premiums to establish this relationship. The study finds that the common explanation of "money illusion" for the correlation between stock prices and inflation has limited explanatory power. The study postulates that in economic recessions, increasing economic uncertainty and risk aversion lead to higher equity risk premiums, which in turn increase yields on stocks. If expected inflation is also high during recessions, positive correlations emerge between equity and inflation. The findings of the study have potential implications for policy, suggesting that if money illusion does not affect the stock market, the Federal Reserve's inflation policy has no bearing on the equity market beyond its implications for real economic growth.

Choudhry (2001) investigates the correlation between stock performance and inflation in several Latin American nations characterized by high inflation levels. Data from Argentina, Chile, Mexico, and Venezuela, spanning from the early 1980s to the late 1990s, is analysed by employing an ARIMA approach. The findings reveal a positive correlation between current stock returns and current inflation, indicating that stock returns may function as a hedge against inflation. Additionally, the study demonstrates that past inflation also has an impact on current stock returns. The study also examines the correlation using real stock returns and finds some evidence of an inverse relationship between current real returns and current and past inflation.

Aliyu (2012) delves into the correlation between inflation rate and the performance of the Egyptian stock market. The data analysed in this paper spans from 1980-1981 to 1997-1998. It specifically assesses the effects of inflation rate on various stock market performance indicators, such as market activity and liquidity. Using co-integration analysis and error correction mechanisms, the study finds significant long-term and short-term relationships between the variables, indicating that inflation rate has had a notable impact on the overall performance of the Egyptian stock market.

Bulent (2017) endeavours to scrutinize the association between equity performance and inflation across a plethora of nations in the aftermath of the war. By utilizing ARIMA

methodology and data from the period commencing January 1947 and ending December 1979, the study disproves the Fisher Hypothesis which states that the real rate of return on common stocks and expected inflation rate are unconnected and that nominal stock returns fluctuate in congruence with expected inflation. The analysis demonstrates a persistent absence of positive association between equity returns and inflation in most of the nations surveyed.

Aliyu (2012) analyses the correlation between inflation and stock market performance in Nigeria and Ghana to examine the impact of inflation on stock market returns and volatility, as well as the impact of asymmetric shocks on stock market volatility in both countries from 1998M1 to 2010M5 and 1999M12 to 2010M5, respectively. The research employs the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model and the quadratic GARCH model. The findings reveal that inflation and its 3-month average have a significant influence on stock market volatility in both Nigeria and Ghana. The study suggests that policies aimed at controlling inflation in these countries would likely lead to reduced stock market volatility, improved stock market returns, and increased investor confidence.

Qamri et al.(2015) aim to investigate the correlation between stock prices and inflation in Pakistan. Utilizing data from the Karachi Stock Exchange (KSE 100) over a ten-year period from 1999 to 2011, this research employs regression and correlation analysis via SPSS to examine past trends in the KSE 100 index. The results of this study indicate a negative relationship between stock prices and inflation, suggesting that when prices of stocks are low, firms may be deterred from entering the capital market and that rising inflation can negatively impact a firm's equity value. Additionally, the study posits that monetary policies aimed at reducing inflation could potentially lead to a decrease in both inflation and stock prices.

Abdallah & Aljareyesh (2017) focuses on the impact of inflation on stock returns of ASE Free float index. Ten years of monthly data from 2005 to 2015 is analysed using multiple regression models. The results indicate that firms are positively correlated with inflation and R square shows a weak relationship between inflation and stock returns.

Aliyu (2012) examines the stochastic properties of inflation rate, stock market returns and their cointegrating residuals using monthly data for the period 1993 to 2015. The

Autoregressive Fractionally Integrated Moving Average (ARFIMA)-based exact maximum likelihood estimation was employed to determine the integration orders of the individual variables as well as the cointegrating residuals. The results indicate that the month-on-month inflation rate, year-on-year inflation rate and stock market returns have non-integer orders of integration, suggesting that any shocks to the variables are highly persistent but eventually disappear. The cointegrating residuals also have non-integer orders of integration, indicating that deviations from the long-run equilibrium are prolonged. The Fractionally Integrated Error Correction Model (FIECM) reveals that the year-on-year inflation rate positively granger causes stock market returns. This supports Fisher Effect and implies that stock market returns in Kenya provide shelter against inflationary pressures.

Jareño et al. (2016) investigate the correlation between stock market performance and nominal and real interest rates, as well as inflation, in the United States from 2003 to 2013 using quantile regression (QR) techniques. The findings demonstrate that the stock market is significantly impacted by fluctuations in interest rates and inflation, with differences observed across sectors and over time. Notably, the effect of changes in these variables tends to be more pronounced during periods of extreme market conditions, distinguishing expansionary periods from recessions.

1.1.3. Murabaha Rate

Murabaha is a type of financing in Islamic banking where the bank purchases a commodity and resells it to the customer at a marked-up price. The marked-up price includes the cost of the commodity and the profit margin agreed upon by the bank and the customer. The effect of Murabaha on stock markets is not well-established in academic literature, and further research is needed to gain a comprehensive understanding.

One study that examined the relationship between Murabaha and stock markets found that an increase in the Murabaha rate is associated with a decrease in stock market returns. This study, conducted by Al-Jarhi and Al-Yahya (2013), used data from the Saudi stock market and found that a 1% increase in the Murabaha rate resulted in a 0.63% decrease in stock market returns.

Another study by Al-Saleh and Al-Sakran (2015) found that Murabaha financing has a positive effect on the performance of Islamic banks, but not on the overall stock market. They found that the positive effect on the performance of Islamic banks was due to the lower risk associated with Murabaha financing compared to other forms of financing.

1.2. Global Factors

First theorical relationship between selected global variable and stock return explain then empirical literature representant.

1.2.1. OVX

In recent years, OVX, also known as the Oil Price Volatility Index, has become a standard tool for measuring stock market uncertainty, especially in oil depended countries. Several studies have examined the role of the volatility index in explaining stock market returns, with some finding a negative relationship between implied volatility and stock market returns (Boako et al, 2016), while others have found a positive relationship between changes in volatility and future stock returns (Volz, 2005; Banerjee et al, 2007). (Bahloul & Ben Amor, 2021). This study adds to the literature on stock market integration in Sudan and Africa by providing insight into the effects of domestic and international macroeconomic indicators on stock markets in the region. It also contributes to the broader understanding of the role of economic policy uncertainty and oil price fluctuations in explaining stock market returns in emerging markets. Additionally, the relationship between the exchange rate and stock prices can have important implications for foreign investors. If there is a negative relationship between the exchange rate and stock prices, then an appreciation of the local currency could lead to a decline in stock prices, which may deter foreign investment. On the other hand, if there is a positive relationship between the exchange rate and stock prices, then an appreciation of the local currency could lead to an increase in stock prices, which may attract foreign investment. Understanding the relationship between the exchange rate and stock prices can help policymakers and investors make informed decisions about the direction of the economy and the best investments to make. On the other hand, the asset market model assumes that stock prices and exchange rates are influenced by the expected future returns of both assets and macroeconomic conditions.

Arouri et al (2012) investigate the volatility spill overs between oil and stock markets in Europe by employing a VAR-GARCH approach to examine the impact of oil price changes on various sectors at both the aggregate and individual levels. The research also analyses the optimal weights and hedge ratios for oil-stock portfolio holdings based on the findings. The data used in this study is weekly and covers the period from January 01, 1998, to December 31, 2009. The findings indicate that there are significant volatility spillovers between oil price and sector stock returns, suggesting that a better understanding of the links between oil price and stock market volatility is crucial for portfolio management in the presence of oil price risk.

Joo & Park (2021) examines the relationship between oil price volatility and stock market returns in ten major oil-importing countries: China, France, Germany, India, Italy, Japan, Korea, the Netherlands, Spain, and the U.S. The data used in this study covers the period from May 2001 to December 2019. The study applies both quantile regression and quantile-on-quantile regression approaches to obtain a comprehensive understanding of the relationship between oil price volatility and stock returns. The results of the study suggest that oil price uncertainty has an asymmetrical effect on stock returns and that these asymmetric behaviours vary depending on the level of stock returns and oil market conditions. Specifically, the results indicate that increasing oil price volatility has a negative effect on stock returns when both oil price volatility and stock returns are low. However, when stock returns are high and oil price volatility is low, rising oil price volatility causes an increase in stock returns.

Lu et al. (2021) contributes to the existing literature on the relationship between oil shocks and stock market volatility in the United States by investigating the effect of oil shocks on stock market volatility using a new hybrid model that combines the least absolute shrinkage and selection operator (LASSO) with the Markov regime-switching model (MS-LASSO). By using daily data from 2019 till 2020. The study considers five different oil shocks and finds that the LASSO method containing Markov regime-switching improves forecasting accuracy from both a statistical and economic perspective. These results are confirmed through robustness checks using alternative evaluation methods, forecasting horizons, and historical periods. Additionally, the study finds that the net price increase indicator (NPI2) is an effective oil shock, while the large price increase (LPI) has little influence during the sample period. The study also finds

that the performance of oil shocks is time-varying, highlighting the importance of considering regime switching in analysing the relationship between oil shocks and stock market volatility. Overall, this study adds to the existing literature by providing a new approach to investigating the relationship between oil shocks and stock market volatility, and by highlighting the importance of considering time-varying effects and regime switching in this analysis.

Arouri et al. (2018) examine the effects of crude oil price shocks on the stock market volatility of the G7 countries using monthly data over the sample period of February 1973 to January 2015. The research identifies the underlying causes of oil price shocks and evaluates the impact of oil supply and demand innovations on financial volatility. The study finds that stock market volatility does not respond to oil supply shocks. However, demand shocks have a significant impact on the volatility of the G7 stock markets. The results suggest that economic policies and financial regulation activities aimed at mitigating the negative effects of unexpected oil price movements should be based on the source of the oil price shocks.

Kang et al. (2015) look at the correlation between the changes in oil prices and the fluctuations in the U.S. stock market. The researchers analyse daily data to create a monthly correlation between the stock market returns and volatility. They use different measures of volatility such as the square of normalized returns, conditional volatility obtained from a volatility model and volatility implied by option prices. The study results show that positive changes in demand for oil and demand for oil-specific products have a negative impact on the correlation between stock market returns and volatility. Whereas disruptions in oil supply have a positive impact. The research also finds that the correlation between oil price shocks and the correlation between stock market returns and volatility is strong and statistically significant. This implies that oil price shocks play an important role in shaping the correlation between stock market returns and volatility and that it is important to consider the cause of these shocks in understanding their impact on the stock market.

Boldanov et al. (2016) examine the dynamic relationship between oil prices and stock market volatility in six major oil-importing and oil-exporting countries. The research period is from January 2000 to December 2014, using Diag-BEKK model. The study

finds that the correlation between oil and stock market volatility changes over time and it can be positive or negative. It also found that there are different patterns in the correlation between oil-importing and oil-exporting countries and that these correlations are affected by major economic and political events such as recessions, terrorist attacks, and financial crises. These findings have important implications for managing risk, pricing derivatives, and adjusting investment portfolios.

Bai & Koong (2018) employ a specific statistical model, the diagonal BEKK model, and a method for analysing dynamic relationships, dynamic impulse response functions, to assess the evolving relationships between oil prices, currency exchange rate fluctuations, and stock market performance in China and the United States over a 24-year period from 1991 to 2015. The study offers a number of noteworthy findings: (i) oil prices exhibit a significant positive correlation with aggregate demand shocks, (ii) positive oil supply shocks have a detrimental effect on the Chinese stock market, (iii) oil price shocks have a persistent negative impact on the trade-weighted US dollar index, (iv) the stock markets of the US and China have a positive correlation with their respective currency exchange rates and dollar indexes, (v) there is a parallel inverse relationship between the US stock market and the dollar and between the Chinese stock market and the exchange rate, and (vi) in recent years, the Chinese stock market has demonstrated greater volatility and responsiveness to aggregate demand and oil price shocks than the US stock market.

Bašta & Molnár (2018) utilizes daily data of VIX and OVX for the period from May 10, 2007 to July 28, 2016 to investigate the relationship between volatility in the equity market (VIX) and oil market (OVX). The authors utilize wavelet methodology to analyze the data on various time scales in order to find the co-movement between the two markets. They found that there is a strong co-movement between the volatilities of the two markets, but it is time-varying and depends on the time scale. The co-movement is strong at yearly horizon, but much weaker at horizons of a few days. Furthermore, the study found that the implied volatility of the stock market leads the implied volatility of the oil market, whereas no such relationship is observed for realized volatilities.

Degiannakis (2018) analyses the impact of oil price fluctuations on stock market volatility in Europe, using daily data from January 1999 to December 2010. The research examines three different measures of volatility, including conditional, realized, and

implied volatility, to assess the relationship between oil price shocks and stock market volatility. The study finds that while supply-side and oil-specific demand shocks do not have a significant effect on volatility, changes in oil prices due to aggregate demand shocks lead to a reduction in stock market volatility. The research also finds that aggregate demand oil price shocks have a substantial explanatory power on both current and forward-looking volatility, and the results are consistent across the aggregate stock market volatility and the volatility of individual industrial sectors.

Lawal et al. (2016) explore the ramifications of fluctuation in exchange rate and oil prices on the volatility of the stock market in Nigeria, as the nation's economy is heavily dependent on oil and foreign trade. The research employs advanced statistical techniques, namely EGARCH estimation, to examine whether either exchange rate volatility or oil price volatility, or both, exert an impact on stock market volatility in Nigeria. The findings of this study indicate that volatility in the stock market is caused by both exchange rate volatility and oil price volatility. Therefore, the study recommends that policymakers should implement policies aimed at stabilizing the exchange rate regime and preserving the net oil exporting position of the economy. Additionally, the study suggests that market participants should take into account the volatility of both exchange rates and oil prices when making investment decisions. The data used in this research were obtained from the Central Bank of Nigeria Statistical Bulletin and cover the period from 1985 to 2014 on a monthly basis.

Balcilar et al. (2019) examine the asymmetric effects of oil price fluctuations on emerging and frontier stock markets by utilizing a quantile-on-quantile approach, which allows for the capture of both typical and exceptional states in each respective market. The sample period for this research varies among countries, however it concludes on December 16, 2016, for all markets. The study finds that oil risk exposures are disparate among emerging and frontier stock markets and exhibit quantile-specific characteristics. The study also observes consistent patterns of oil risk exposures among groups of nations that encompass both importers and exporters. The authors posit that oil price risk serves as a systematic risk proxy, reflecting concerns about global growth prospects, rather than being merely an import/export commodity. The study suggests that signals from the oil market, such as measures of trading activity in oil futures or changes in basis values, could be employed by policy makers to improve models of stock market volatility.

Lu et al. (2020) examine the feasibility of utilizing the CBOE crude oil volatility index (OVX) to forecast China's oil futures volatility through the implementation of Markov-regime mixed data sampling (MS-MIDAS) models by using monthly data from March 27, 2018 to April 16, 2020.Our in-sample analysis reveals that OVX holds significant forecasting power for future short-term, middle-term, and long-term volatilities in China's oil futures market. Furthermore, our proposed model, MS-MIDAS-RV-OVX, demonstrates exceptional performance in comparison to other competing models. findings also confirm that OVX possesses valuable predictive information for oil realized volatility, particularly in the middle-term and long-term horizons, and that regime switching is an effective method for addressing structural breaks within the energy market. Additionally, this study conducts an economic value analysis and explores the asymmetric effects of OVX on different trading hours and good (bad) OVX. analysis indicates that OVX demonstrates superior performance during daytime trading hours and that good OVX is more effective in forecasting oil futures RV than bad OVX. conclusions remain valid even during the highly volatile period of the COVID-19 pandemic.

Overall, these studies suggest that the OVX can have an impact on stock market volatility and returns. However, more research is needed to fully understand the relationship between the OVX and stock markets.

1.2.2. VIX

Several studies have investigated the relationship between the VIX and stock market returns. A study by Chen, Roll, and Ross (1986) found that higher VIX levels are associated with lower stock returns. This is known as the "inverse relationship" between the VIX and stock returns. Other studies, such as that by Baker and Wurgler (2006), have also found an inverse relationship between the VIX and stock returns.

However, some studies have found mixed results. For example, a study by Giot (2003) found that the relationship between the VIX and stock returns is not consistent across different subperiods. Another study by Chiarella and Iori (2008) found that the relationship between the VIX and stock returns depends on the level of market volatility.

Sarwar (2012) studies the intertemporal relationships between the CBOE market volatility index (VIX) and stock market returns in Brazil, Russia, India, and China

(BRIC), and between VIX and U.S. stock market returns, to determine if VIX serves as an indicator of investor fear in BRIC and U.S. markets. The study conducts the VIX-returns analysis for the period from 1993 to 2007. The results suggest a strong negative contemporaneous relationship between daily changes (innovations) in VIX and U.S. stock market returns. This relationship is stronger when VIX is high and more volatile. Similar negative contemporaneous relationships between VIX and equity returns also exist for China and Brazil during 1993-2007, and for India during 1993-1997. The study also finds a strong asymmetric relationship between innovations in VIX, and daily stock market returns in the U.S., Brazil, and China, suggesting that VIX is more of a gauge of investor fear than investor positive sentiment. However, this asymmetric relationship is much weaker when VIX is large and more volatile. These results have potential implications for portfolio diversification and for stock market and option trading timing in the equity markets of Brazil, India, and China. Overall, the results of the study indicate that VIX is not only an investor fear gauge for the U.S. stock market but also for the equity markets of China, Brazil, and India.

Dutta (2018) investigates the relationship between global oil prices and the US energy sector stock markets by analysing their implied volatility indexes from the Chicago Board of Options Exchange (CBOE). The study also includes data on the US VIX to account for the effect of global equity market uncertainty. The authors use ARDL bound tests to determine whether there is cointegration among the volatility series used. The sample period for this study is from March 16, 2011, to June 30, 2017, comprising a total of 338 weekly observations. The findings indicate that there is a long-term relationship between oil and stock market implied volatility indexes. Additionally, using the Toda-Yamamoto version of the Granger causality test, the study reveals short-term connections or "lead-lag" relationships between the implied volatilities of international oil and the US energy sector stock markets. These results have significant implications for investors and policymakers.

Mensi et al.(2014) investigate the correlation between the emerging stock markets of the BRICS countries and global factors. By using quantile regression, the study examines the period from September 1997 to September 2013. The findings show that the BRICS stock markets have a dependence on global stock (S&P index) and commodity markets such as the, oil, and gold as well as changes in U.S. stock market uncertainty (as measured by the

CBOE Volatility Index). This dependence structure is often asymmetric and was affected by the onset of the global financial crisis. However, the study found that U.S. economic policy uncertainty had no impact on the BRICS stock markets.

Bekaert & Hoerova (2014) investigate the VIX index, utilizing a variety of state-of-the-art volatility forecasting models, the study provides an accurate measure of the conditional variance. The study then examines the predictive capabilities of the VIX and its two components for stock market returns, economic activity, and financial instability. The research finds that the variance premium is a reliable predictor of stock returns, while the conditional stock market variance is a superior predictor of economic activity. Furthermore, the conditional stock market variance has a relatively higher predictive capacity for financial instability compared to the variance premium.

Fernandes et al.(2014) study the correlation of the daily market volatility index (VIX) from the Chicago Board Options Exchange (CBOE) with other financial market indicators over the period of January 2, 1992, to January 15, 2013.The study found that the VIX index exhibited long-term dependence and had a negative relationship with the S&P 500 index return, as well as a positive correlation with the volume of the S&P 500 index. Additionally, the study found that the term spread had a slightly negative long-term effect on the VIX index, after controlling for potential multicollinearity and endogeneity. The results indicate that linear associations between the VIX index and other financial market indicators are a reliable and robust model for forecasting the VIX index.

Chen & Sun (2022) apply advanced high-dimensional and time-varying techniques to investigate the transmission of US financial market volatility to China's nine financial sub-sectors. The research finds evidence of non-linear Granger causality from US financial volatility (VIX) to China's financial markets, with increased US financial volatility having a negative impact on the next-day performance of the stock, bond, fund, interest rate, foreign exchange, industrial product, and agricultural product markets, and a positive impact on the gold and real estate markets. The industrial product market is found to be the most affected by US financial volatility, followed by the stock, agricultural product, fund, real estate, bond, gold, foreign exchange, and interest rate markets. The study also finds that major risk events such as the global financial crisis can exacerbate the contagion effects of US financial volatility on China's financial markets.

The results of this research support the effectiveness of China's actions to prevent and manage major financial risks during the COVID-19 pandemic.

Gürsoy (2020) examines of the influence of the Chicago Board Options Exchange (CBOE) volatility index (VIX) on the stock markets of the BRICS countries, which consist of Brazil, Russia, India, China, and South Africa, between the periods of 2011-2020 monthly data . The study employs a Toda-Yamamoto causality test utilizing daily closing data and conducts an analysis on the bilateral effects of each variable. The research findings indicate that the VIX index has a bilateral causality with the Russia (RTSI) and South Africa (INVSAF40) stock markets within the baseline period. However, it was determined that the movements in the VIX index possess a unilateral causality relationship with the India (BSESN) and China (SSEC) indices. In contrast, it has been observed that the VIX index does not have a unilateral or bilateral causal relationship with the Brazilian (BOVESPA) stock market.

Mariničevaitė & Ražauskaitė (2015) assess the ability of the CBOE S&P500 Volatility index (VIX) to predict the returns of emerging stock market indices in comparison to local stock market volatility indicators. The data used for this research includes daily returns of the CBOE S&P500 VIX, local BRIC stock market volatility indices, and BRIC stock market MSCI indices from January 1, 2009, to September 30, 2014. The analysis is carried out in two steps: first, a Spearman correlation analysis is conducted between daily changes in the CBOE S&P500 VIX, local BRIC stock market VIX, and MSCI BRIC stock market indices returns; second, a multiple regression analysis with ARCH effects is performed to estimate the relevance of the CBOE S&P500 VIX and local VIX in determining BRIC stock market returns. The research finds a weak correlation between the CBOE S&P500 VIX and local VIX (except for Brazil). Additionally, the results challenge the assumption that the CBOE S&P500 VIX is an indicator of global risk aversion. The study concludes that commonly documented trends of rising globalization and stock market co-integration are not yet present in emerging economies, therefore the usage of the CBOE S&P500 VIX alone in determining BRIC stock market returns should be considered cautiously and local volatility indices should be considered in analysis. Furthermore, the data confirms the presence of safe-haven properties in the Chinese stock market index.

Anand (2016) investigates the relationship between the depth and bid-ask spreads of the CBOE option market in comparison to those of the NYSE stock market. The results indicate that while the CBOE option market has excellent market depth, its bid-ask spreads are like those of the NYSE stock market, even though the average option is worth less than half of a stock plus borrowing. The difference in market mechanisms between the CBOE and NYSE is suggested as the reason for this trade-off. Additionally, the study finds that the adverse-selection component of the option spread, which indicates the level of information-related trading on the CBOE, is minimal.

Tekin & Hatipoolu (2017) examine of the relationship between oil prices, currency exchange rates, and VIX on Borsa Istanbul from 2002 to 2016, utilizing a quantile regression methodology. Despite previous studies that have evaluated the individual impact of these factors on the stock market, this research seeks to delve deeper by examining the combined effect of these factors and utilizing a quantile regression approach. The aim is to comprehend the ways in which these global factors, and in which quantiles, exert influence on the equity market in Turkey during the specified time frame. The quantile regression methodology allows for the examination of dynamic associations, which can assist investors in developing investment strategies for BIST. The findings of this study indicate that the BIST index is significantly affected by the VIX in all quantiles, while the dollar has an impact only in higher quantiles. The stock market effect of oil prices implies that there is not an asymmetric relationship between the two variables, it is only significant in the middle quantile.

In summary, the literature on the relationship between the VIX and stock market returns is mixed, with some studies finding an inverse relationship and others finding mixed results. However, most of studies found an inverse relationship between the VIX and stock returns.

CHAPTER 2: DATA and METHDOLOGY

In this section, we will be briefly presenting our data, then reviewing the variation of our data set before and after the separation, and we will end this section by explaining our methodology and presenting our specification.

2.1. Data

In this study, we utilize monthly data from the Central Bank of Sudan and the Khartoum stock market index from 2007 to 2018. The Central Bank data includes various economic indicators such as exchange rates, inflation rates, and Murabaha rates, while the stock market index data provides information on the performance of the overall market. This time frame allows for a comprehensive analysis of the relationship between the economy and the stock market over a prolonged period. The use of monthly data allows for a detailed examination of any potential trends or patterns that may emerge. In addition to the data from the Central Bank and the stock market index, this study also utilizes monthly data of oil price volatility, we use the CBOE Crude Oil Volatility Index (OVX) and the CBOE Volatility Index (VIX) to measure the volatility of stock markets. These indices provide a valuable perspective on the level of uncertainty and risk associated with oil prices, which is an important factor in the relationship between the economy and the stock market. The use of these indices in conjunction with the other data allows for a more comprehensive analysis of stock market performance. It also provides a better understanding of how volatility of oil prices can impact the overall economy and financial markets.

2.1.1. Data Review

2.1.1.1. Exchange Rate 2007-2018

The Foreign Exchange Policies in 2007 were designed to maintain exchange rate stability through the adoption of a managed floating exchange rate system, the promotion of foreign exchange reserve formation, and the standardization, regulation, and liberalization of the foreign exchange market. In 2007, several changes were made to the foreign exchange regulations to ensure a practical approach, including the allowance of free foreign currency accounts that could only be funded through transfers from abroad,

but could be replenished with cash or exchange purchased abroad. Banks, foreign exchange offices, transfers, or payments from private accounts were also not allowed to sell through exchange offices for import purposes only. Banks were permitted to sell cash to the public within limits of ten thousand US dollars or the equivalent in other currencies, and L/C receivable margins were abolished, allowing banks to set appropriate percentages based on the client's credibility status. The Central Bank of Sudan has made significant efforts to maintain exchange rate stability and the external credibility of the Sudanese banking system. To this end, the Central Bank of Sudan has implemented policies that aim to increase foreign reserves to meet external obligations. In an effort to achieve this, the Central Bank of Sudan has continued to use a controlled floating exchange rate, intervening in foreign exchange as necessary to maintain the exchange rate's absolute value. As a result of economic reform undertaken by the government, the local exchange rate was reduced from 4.4 Sudanese pounds to the US dollar to 5.7 Sudanese pounds in September 2013. To reflect the actual value of the national currency, the Sudanese pound, the Central Bank of Sudan devalued the national currency by 6% in 2014. In 2015, the Central Bank of Sudan intervened with several measures to achieve relative stability in the exchange rate and bridge the gap between the official and parallel exchange rates to promote stability in the exchange rate, the measures adopted include regulating foreign exchange resources and reorganizing local and local foreign exchange accounts. Foreign entities are encouraged to bring the resources of foreign organizations to the official market, and foreigners are required to pay for hotel services and other tourism activities in foreign currency. These policies and measures have led to relative stability in the exchange rate in 2016, and the spread between official and parallel market rates has shrunk to an average of 5% in December 2016. In order to further reduce the gap between the official exchange rate and the parallel market exchange rate, the indicative exchange rate of the official market was adjusted several times during 2018.
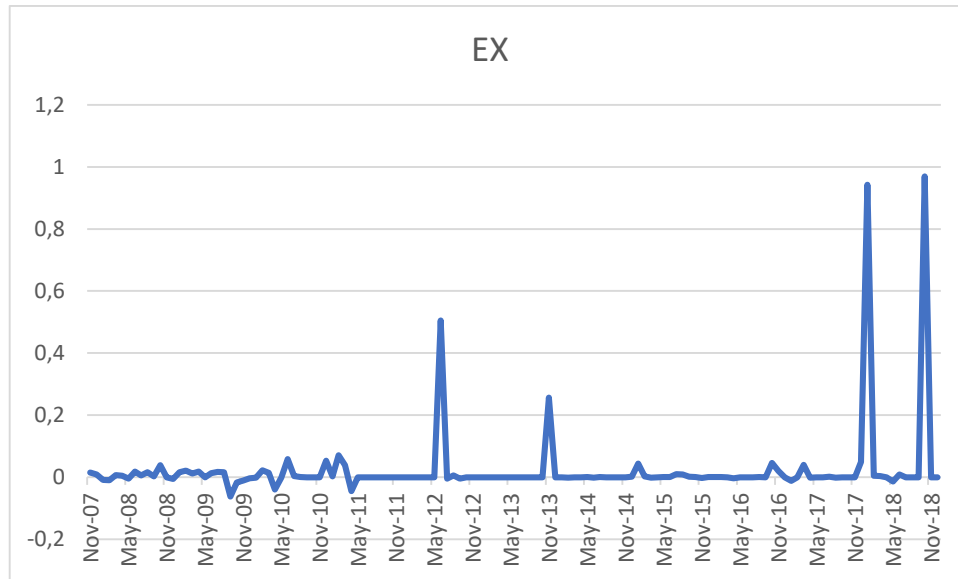
Graph 1: Exchange Rate 2007-2018

Source: Created by the author

2.1.1.2. Inflation Rate 2007 – 2018:

Inflation rates recorded relatively low levels During the first quarter of 2008, inflation was in the single digits. They began to escalate in April with a double-digit rate until August, then declined in September until December with a double-digit rate. Despite that, it rose the annual average inflation rate increased markedly from 1.8% in 2007 to 3.14% in 2008. The average yearly inflation rate decreased from 3.14% in 2008 to 2.11% in 2009. Data indicate that Sudan ranked first in terms of GDP growth rates, which rose from 1.4% in 2012 to 3.6% in 2013, and in inflationary pressures, which amounted to 37.1% in 2013. This increase in the average general inflation rate (2009-2013) from 11.2% in 2009 to 37.1% in 2013 was due to the implementation of economic reform measures, mainly devaluation of the national currency and the partial lifting of subsidies on fuel. The average annual rate of general inflation was 22.9% during the period (2009-2013), but it rose significantly above the previous two years' average, reaching 35.1% and 37.1% respectively. The general inflation rate then decreased from 41.9% at the end of 2013 to 25.7% as a result of the policies implemented by the end of 2014. The inflation rate increased from 16.9% in 2015 to 17.8% in 2016, and from 32.4% in 2017 to 63.3% in 2018. The inflation rate accelerated through the end of the year, rising from 25.2% in December 2017 to 72.9% in December 2018.
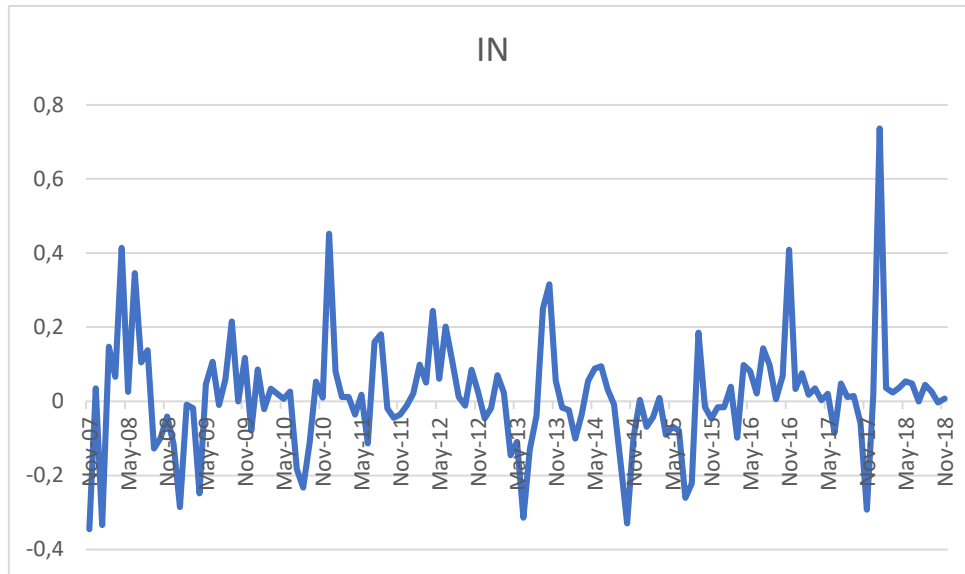
Graph 2: Inflation Rate 2007-2018

Source: Created by the author

2.1.1.3. Murabaha Rate 2007 – 2018:

The fixed profit margin for Murabaha is set at 10% as an indicator. However, during 2007, the weighted average profit margins for Murabaha ranged between 11.4% and 12.6%, and the monthly average profit margins ranged between 6.7% and 18% as the volume of financing increased. These profit margin ranges indicate the performance of Murabaha financing during 2007. in the forms of Murabaha, Modaraba and Salam and its decrease in the states of participation, contracting, leasing and others, where the flow a portion of the funding in the form of Murabaha increased from 4,899.6 million pounds in 2008 to 3,186.8 million pounds in 2009, a rate of 7.18%. The share of Murabaha financing accounted for 52.2% of the total financing flow during 2014, due to the long experience of banks with this mode and its ease of use, as well as its low administrative and supervisory cost and guaranteed profits. Funding flows through Mugla, participation, and other patterns contributed 13.4%, 9.4%, and 14.8%

respectively. However, in 2015, the share of Murabaha financing decreased to 49.8% of the total financing flows, compared to 52.2% in 2014.
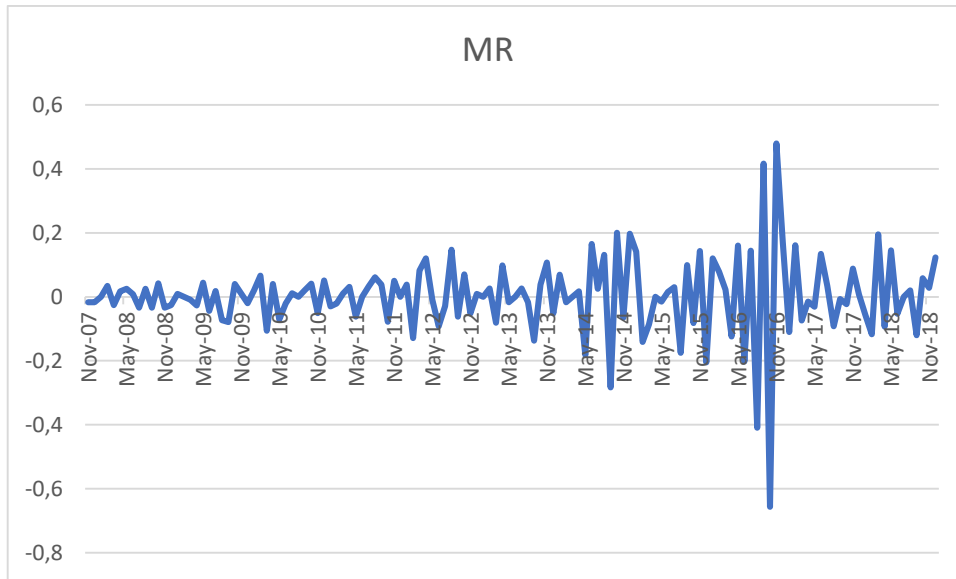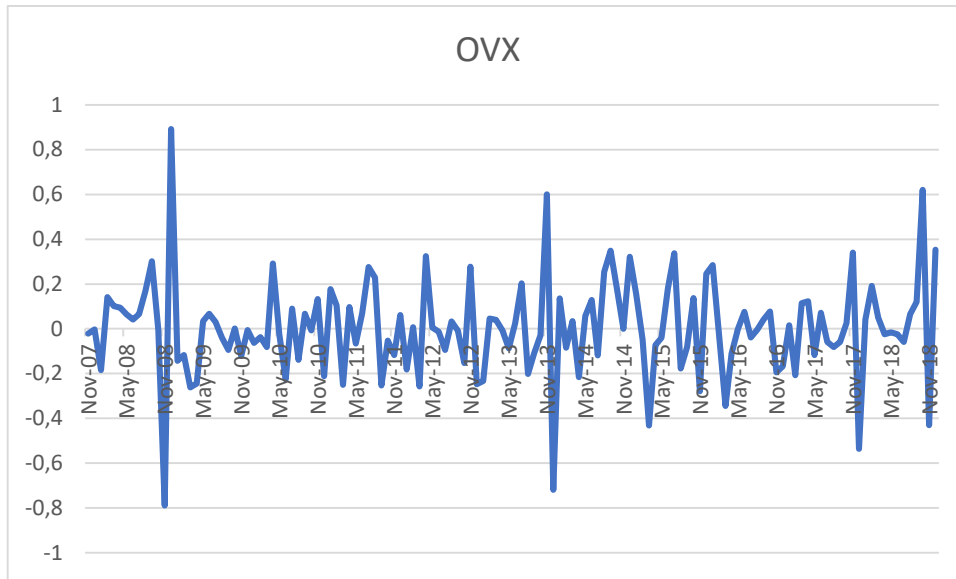
Graph 3: Murabaha Rate 2007-2018

Source: Created by the author

2.1.1.4. OVX

The CBOE Crude Oil Volatility Index, also known as the OVX, is a measure of the volatility of crude oil prices. It is calculated using the same methodology as the VIX but is based on options on crude oil futures. The impact of the OVX on stock markets has been the subject of several academic studies.
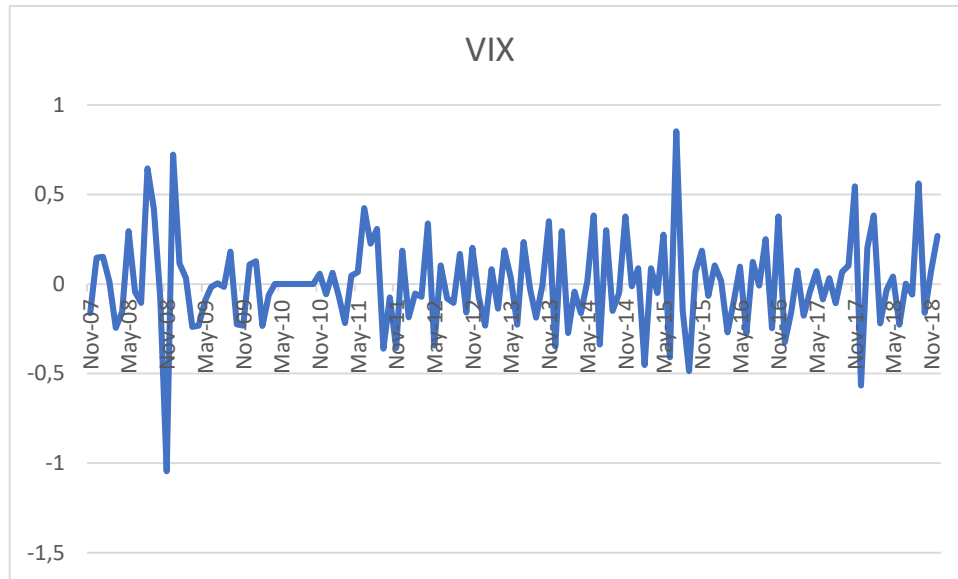
Graph 4: The Variation of OVX 2007-2018

Source: Created by the author

2.1.1.5. VIX

The VIX, also known as the Chicago Board Options Exchange's CBOE Volatility Index, is a measure of the implied volatility of S&P 500 index options. It is often referred to as the "fear index" or the "investor fear gauge" because it reflects market participants' expectations for future volatility.
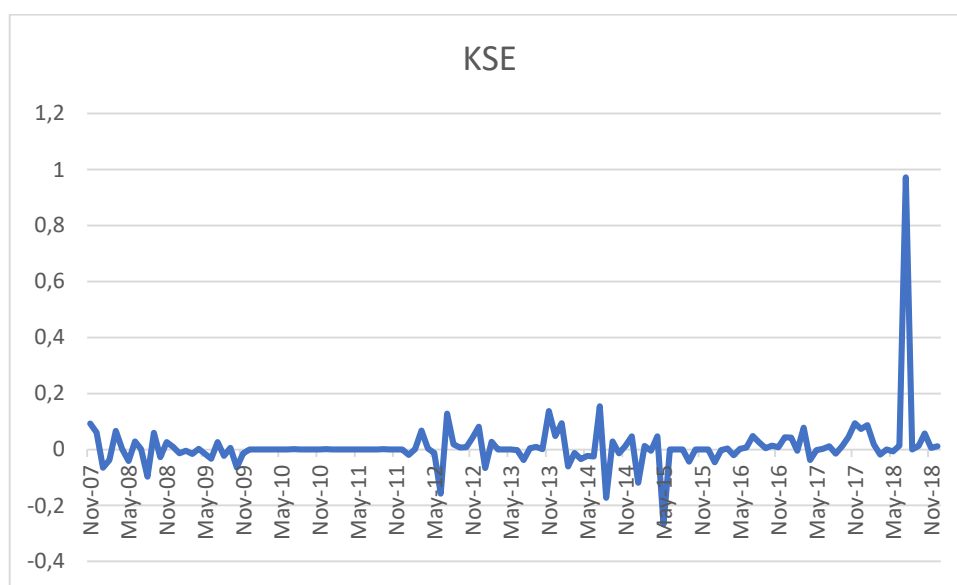
Graph 5: The Variation of VIX 2007-2018

Source: Created by the author

2.1.1.6. Stock Market in Sudan

The Sudanese Stock Exchange (SSE) was founded in 1995 with the help of the Eastern and Southern African Common Market (COMESA). The SSE trades common shares, investment units, government investment certificates and mutual funds (GICs). Trading at the SSE is handled through brokers and occurs during a one-hour period each day. In January 2012, the SSE switched from manual trading to computer-based trading, but brokers are It is still necessary to be physically present at the exchange. One key feature of the SSE is that it operates based on Islamic Sharia principles. This means that the market aims to offer investment portfolios that meet certain criteria, such as being in a legitimate field of economic activity, engaging in interest-free dealings in assets and liabilities, and being dominated by real assets. The SSE is also supervised and regulated by the Sudanese Central Bank. the Khartoum Stock Exchange's rules and regulations (KSE)are based on Islamic Sharia principles, which means that certain types of assets and financial instruments may be prohibited or restricted. For example, companies listed on the KSE may not be involved in the production of illegal goods and must not use interest-based financing to raise capital. or earn interest from investments securities. Additionally, the shares of a company listed on the KSE must represent equity in real assets, rather than cash or debts receivable. As a result of these rules, the asset composition traded has

changed. on the KSE may be different from other stock markets. 10 In order to provide an Islamic equivalent of conventional bonds, the KSE also offers Government Musharaka Certificates (GMCs), which are asset-backed securities issued by the government on a quarterly basis. 20 GMC profitability is determined by the financial performance of the underlying portfolio companies. and can be as high as 33% per year. The KSE has contributed to the investment climate in Sudan in several ways, including promoting the auditing profession as a requirement for companies to list on the exchange and submit audited accounts for the last two years and every year after listing in comparison to many other Arab stock exchanges, The KSE, a small market, has a limited number of companies on its roster and most of the shares are traded irregularly, resulting in low market capitalization and traded value. The banking, telecom, and certificates sectors are 13 the main drivers of trading activity on the KSE in terms of volume and number of shares traded. The KSE index, a weighted measure of market capitalization, is used to gauge the overall performance of the KSE Despite its The KSE is characterized as a highly concentrated market, with a few companies accounting for a significant portion of total market capitalization and growth. traded value. It is also considered an illiquid market, as only a few companies' shares are tradable.

Graph 6: The Variation of Khartoum Stock Market Index 2007-2018

Source: Created by the author

33

2.1.2. Descriptive Statistics

Table 1: Descriptive Statistics 2007-2011

	VIX	OVX	MR	KSE	IN	EX
Mean	0.0071	0.0038	-0.0045	-0.0015	0.0085	0.0064
Maximum	0.7216	0.8920	0.0663	0.0925	0.4519	0.0706
Minimum	-1.0451	-0.7894	-0.1063	-0.0972	-0.3448	-0.0620
Std. Dev.	0.2663	0.2266	0.0387	0.0325	0.1657	0.0234
Skewness	-0.5566	0.3954	-0.5119	0.0944	0.2829	0.0277
Kurtosis	8.0766	9.3591	2.7854	5.2225	3.9831	5.0547
Jarque-Bera	50.647***	76.995***	2.0520	9.3285***	2.4128	7.9223**

Source: Created by the author

Note: ***, ** and * significant at 1%,5%, and10%, respectively VIX refers to Chicago board options exchange's, OVX refers to Crude oil volatility index, MR refers to Murabaha, KSE refers to Khartoum stock market index, IN refers to Inflation rate, EX refers to Exchange rate.

The descriptive statistics for the VIX financial measure include the mean (0.0071), maximum (0.7216), minimum (-1.0451), standard deviation (0.2663), skewness (-0.5566), and kurtosis (8.0766). The mean represents the average value of the sample data, while the median is the middle value in the sample data. The maximum and minimum values represent the highest and lowest values in the sample data, respectively. The standard deviation measures the spread of the sample data around the mean, while skewness measures the asymmetry of the data around the mean. A negative skewness value indicates a left-skewed distribution, meaning the left tail is longer than the right tail. Kurtosis measures the shape of the sample data around the mean, with higher values indicating a more peaked distribution than a normal distribution. The Jarque-Bera was performed to assess the normality of the sample data, and the results provide strong evidence the data is normal.

The descriptive statistics for the OVX financial measure include the mean (0.0038), maximum (0.8920), minimum (-0.7894), standard deviation (0.2266), skewness (0.3954),

and kurtosis (9.3591). The Jarque-Bera test result, showed that the sample data have matched a normal distribution.

For Murabaha he results of the Jarque-Bera test indicate strong evidence against the normality of the MR data. The mean (0.0044), maximum (0.4788), and minimum (-0.6567) give an idea of the central tendency and variability of the data. The standard deviation (0.1441) measures the spread of the data around the mean. The skewness (-0.7088) indicates that the data is left-skewed, meaning the left tail is longer than the right tail. The kurtosis (8.2063) indicates that the distribution of the data is more peaked than a normal distribution.

The results of the statistical analysis on the KSE data indicate that the mean is (-0.0015), the maximum value in the sample data is (0.0925), while the minimum is (-0.0972). The standard deviation of the data is (0.0325), indicating the spread of the data around the mean. The skewness of the data is (0.0944), indicating a slight asymmetry in the distribution of the data. The kurtosis of the data is (5.2225), suggesting a shape that is moderately peaked compared to a normal distribution. The Jarque-Bera test result, showed that the sample data have matched a normal distribution.

The values in the IN series are: Mean (0.0085), Maximum (0.4519), Minimum (-0.3448), Standard deviation (0.1657), Skewness (0.2829), Kurtosis (3.9831), and the Jarque-Bera test These values provide information about the central tendency, spread, shape, and normality of the series.

For EX The data set has a mean value of (0.0064), with a maximum value of (0.0706) and a minimum value of (-0.0620). The standard deviation is (0.0234), which indicates the spread of the sample data around the mean. The skewness is (0.0277), showing a positive right-skewed distribution. The kurtosis is (5.0547), indicating a more peaked distribution than a normal distribution. The Jarque-Bera test result, showed that the sample data have matched a normal distribution.

	VIX	OVX	MR	KSE	IN	EX
Mean	-0.0031	0.0035	0.0044	0.0177	0.0115	0.0300
Maximum	0.8525	0.6208	0.4788	0.9716	0.7360	0.9690
Minimum	-0.5657	-0.7188	-0.6567	-0.2678	-0.5168	-0.0540
Std. Dev.	0.2514	0.2217	0.1441	0.1193	0.1478	0.1493
Skewness	0.4155	-0.0436	-0.7088	5.8086	0.7338	5.5250
Kurtosis	3.5058	4.1920	8.2063	49.1253	10.067	33.2774
Jarque-Bera	3.7074	5.5957*	039.114***	33.8107***	096. 204.***	73.40***

Source: Created by the author

Note: ***, ** and * significant at 1%,5%, and10%, respectively VIX refers to Chicago board options exchange's, OVX refers to Crude oil volatility index, MR refers to Murabaha, KSE refers to Khartoum stock market index, IN refers to Inflation rate, EX refers to Exchange rate.

the results for VIX indicate the following: the mean of the sample data is (-0.0031), the maximum value is (0.8525), the minimum value is (-0.5657), the standard deviation is (0.2514), the skewness is (0.4155) and the kurtosis is (3.5058). A positive skewness indicates a right-skewed distribution, and higher kurtosis indicates a more peaked distribution than a normal distribution. The Jarque-Bera test result shows the sample data have not matched a normal distribution.

The results for OVX indicate the following: the mean of the sample data is (0.0035), the maximum value is (0.6208), the minimum value is (-0.7188), the standard deviation is (0.2217), the skewness is (-0.0436), and the kurtosis is (4.1920). while the skewness and kurtosis measure the asymmetry and shape of the sample data around the mean, respectively. A negative skewness indicates a left-skewed distribution, and higher kurtosis indicates a more peaked distribution than a normal distribution.

The results for MR indicate the following: the mean of the sample data is (0.0044) the maximum value is (0.4788), the minimum value is (-0.6567), the standard deviation is (0.1441), the skewness is (-0.7088) and the kurtosis is (8.2063). The Jarque-Bera test result, showed that the sample data have matched a normal distribution.

The results for KSE indicate the following: the mean is (0.0177), the maximum value is (0.9716), the minimum value is (-0.2678), the standard deviation is (0.1193), the skewness is (5.8086) and the kurtosis is (49.1253). The Jarque-Bera was performed to assess the normality of the sample data, and the results provide strong evidence that the data is normal.

The results for IN indicate the following: the mean of the sample data is (0.0115), the maximum value is (0.7360), the minimum value is (-0.5168), the standard deviation is (0.1478), the skewness is (0.7338), and the kurtosis is (10.0679). The Jarque-Bera test result, showed that the sample data have matched a normal distribution.

The results for IM indicate the following: the mean of the sample data is (-0.0042), the maximum value is (0.5994), the minimum value is (-1.1305), the standard deviation is (0.2930), the skewness is (-0.9817) and the kurtosis is (4.8721). The Jarque-Bera was performed to assess the normality of the sample data, and the results provide strong evidence the data is normal.

The results for EX indicate the following: the mean of the sample data is (0.0300), the maximum value is (0.9690), the minimum value is (-0.0540), the standard deviation is (0.1493), the skewness is (5.5250), and the kurtosis is (33.2774). The Jarque-Bera test result, showed that the sample data have matched a normal distribution.

2.1.3. Unit Root Test

Table 3: Unit Root Test

variables	ADF	PP
ΔOVX	-9.47***	-22.87***
Δ VIX	-9.86***	-22.63***
Δ EX	-12.02***	-19.73***
ΔIN	-6.36***	-18.53***
ΔMR	-9.95***	-33.33***
ΔKSE	-10.58***	-19.23***

Source: Created by the author

Note: ***, ** and * significant at 1%,5%, and10%, The variables listed at the bottom of the table (ΔOVX, ΔVIX, ΔEX, ΔIN, ΔMR, and ΔKSE). respectively VIX refers to Chicago board options exchange's, OVX refers to Crude oil volatility index, MR refers to Murabaha, KSE refers to Khartoum stock market index, IN refers to Inflation rate, EX refers to Exchange rate.

This is a table of results from a set of Phillips-Perron (PP) Augmented Dickey-Fuller (ADF) tests. The numbers in the table are t-statistics, with asterisks indicating the level of significance.

The variables listed at the bottom of the table (ΔOVX, ΔVIX, ΔEX, ΔIN, ΔMR, and ΔKSE) are the time series being tested. The negative values of the t-statistics in the table indicate that the null hypothesis is rejected for each series, and that there is strong evidence that each series is stationary.

A unit root test is used to determine if a time series data has a unit root, meaning it is non-stationary. Non-stationary time series data can make it difficult to analyze and forecast, as the mean and variance of the data may change over time. The unit root test checks for the presence of a unit root in the time series data and helps determine if the data needs to be differenced to make it stationary before further analysis. Unit root tests include the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test.

2.2. Methodology

To investigate this relationship, the researcher uses quantile regression, Quantile regression can be useful when the distribution of the response variable is not known symmetrical or is otherwise not well-described by the mean. By estimating the conditional median, Quantile regression can provide a more complete picture of the relationship between predictor variables and response variables, especially at different points along the response variable's distribution. The quantile regression developed by Koenker (1978).

The main advantage of using quantile regression is that the method allows understanding the relationships between variables beyond the data's mean, which makes it useful in understanding non-normally distributed outcomes that have nonlinear relationships with prediction variables.

where Q (τ | X) is the τ-the quantile of the response variable given a set of predictor variables X, $\beta(\tau)$ is the vector of parameters to be estimated, and X' is the transpose of the matrix of predictor variables.

In this equation, the parameters $\beta(\tau)$ are estimated by minimizing a quantile loss function, which is a measure of the deviation between the predicted response and the actual response, subject to the constraint that the quantile level is equal to τ.

The specific form of the quantile loss function used will depend on the estimation method being used, but some common examples include the least absolute deviation method and the gradient boosting method. The equation form for quantile regression, as proposed by Koenker (1978) is:

$$Q_y = \left(\frac{T}{X}\right) = X^{'}\beta(\tau) \qquad (1)$$

Where:

Q(t|x) is the t-th quantile of the response variable, given a set of predictor variables x.

x' is the transpose of the vector of predictor variables.

beta(t) is a vector of parameters to be estimated, which represents the t-th quantile of the conditional distribution of the response variable.

This equation relates the quantile of interest, t, to the predictors through a set of parameters, beta(t). The parameters can be estimated using a variety of optimization methods, such as linear programming or gradient descent.

It's important to note that it is different from the OLS (ordinary least square) regression, which estimates the conditional mean of the response variable.

Following the previous research papers, Bilson et al (2001) and Bahloul and Ben Amor (2021), this study uses the following regression:

$$R_{it} = \alpha_i + \sum_{j=1}^{k} yij\ F_{IJT}^{L} + \sum_{m=1}^{N} \beta_{im\ f_{mt}^{G}} + \varepsilon_{it} \qquad (2)$$

Where:

R_{it} : is the retun of the country i stock market index at time t

yij is the sensitivity of i the stock market index retun to the j th local factors

F_{IJT}^{L} is the realization of the j th local factor in the i country at time t

β_{im} is the sensitivity of the i th stock market index to the m th global factors

f_{mt}^{G} is the realisation of the m th global factor at time

ε_{it} is the residual term of country i at time t

We can rewrite our model in a more detailed way as follow:

$$kse = \alpha_{0+}\ \alpha_1 EX + \alpha_2 IN + \alpha_3 MR + \alpha_4 OVX + \alpha_5 VIX + \varepsilon_T \qquad (3)$$

The main equation includes the independent variables oil price volatility OVX and VIX as global factors, and (EX) exchange rates, (IN)inflation rates, (MR)Murabaha returns as local and independent variables. KSE Khartoum stock index as dependent variable. These variables are being used to investigate the impact on the dependent variables. We estimate one equation for two time periods from 2007 till 2011 before Sudan separation and second period from 2011 till 2018 after Sudan separation.

CHAPTER 3: EMPIRICAL RESULTS

In this section, we present the results for the two separate periods: before and after the Sudanese separation. Then we compare the results of both periods.

3.1. Results for the First Period: from 2007 to 2011

Table 4: Results of Quantile Regression and OLS First Period 2007- 2011

Variables	Quantile level			
	Q1	Q5	Q9	OLS
C	-0.0493	0.0052	0.0579	-0.0016
	0.0656	0.7030	0.1146	0.9124
EX	0.2017	-0.0075	0.1251	0.0185
	0.1427	0.8834	0.5470	0.8834
IN	0.0004	0.0002	-0.0015	-0.0024
	0.9083	0.9163	0.7317	0.3336
MR	-0.0160	-0.0031	-0.0746	-0.0224
	0.2638	0.7135	0.1550	0.0724*
OVX	8.9305	-0.0001	-0.0003	-2.8505
	0.8536	0.6925	0.5207	0.9296
VIX	-0.0878	-0.0075	-0.0017	-0.0424
	0.0151*	0.8483	0.9792	0.1263

Source: Created by the author

Note: ***, ** and * significant at 1%,5%, and10%, respectively VIX refers to Chicago board options exchange's, OVX refers to Crude oil volatility index, MR refers to Murabaha, KSE refers to Khartoum stock market index, IN refers to Inflation rate, EX refers to Exchange rate.

The results of the Ordinary Least Squares (OLS) regression for the first period are being described in table 4 as only the Murabaha rate has a negative and significant impact. The exchange rate has a positive and the inflation rate has a negative but both insignificant effect impact on the Khartoum stock market. On the other hand, Additionally, the OVX and VIX variables are negatively related to the dependent variable, but their impact is insignificant.

Quantile results show that for the Q 1 results, the exchange rate and inflation rate have a positive relationship with the Khartoum stock market, but their impact is not statistically significant. The Murabaha rate has a negative relationship with the Khartoum stock market, but its impact is also not statistically significant. The "OVX" variable has a positive relationship with the Khartoum stock market and its impact is insignificant. The "VIX" variable has a negative relationship with the Khartoum stock market, but its impact is statistically significant.

For the Q5, the exchange rate has a negative relationship with the Khartoum stock market, but its impact is not statistically significant. The inflation rate has a positive relationship with the Khartoum stock market, but its impact is also not statistically significant. The Murabaha rate has a negative relationship with the Khartoum stock market, but its impact is not statistically significant. The "OVX" variable has a positive relationship with the Khartoum stock market, but its impact is not statistically significant. The "VIX" variable has a negative relationship with the Khartoum stock market, but its impact is not statistically significant.

For the Q9 regression, the exchange rate has a negative relationship with the Khartoum stock market, but its impact is not statistically significant. The inflation rate, Murabaha rate, "OVX" and "VIX" variables have a negative relationship with the Khartoum stock market, but their impacts are not statistically significant.

3.2. Results of the Second Period: from 2007 to 2018

Table 5: Results of Quantile Regression and OLS Second Period 2011- 2018

variables	Quantile level			
	Q1	Q5	Q9	OLS
C	-0.0426 0.0392	0.0052 0.7979	0.1373 0.0013**	0.0566 0.2131
EX	0.0034 0.0001***	0.0018 0.0763*	0.0009 0.3119	0.0022 0.5795
IN	0.0030 0.0215*	0.0004 0.6542	0.0002 0.9169	0.0002 0.9223
MR	-0.0073 0.0565*	-0.0016 0.4858	0.0008 0.8712	-0.0016 0.8417
OVX	0.0001 0.8311	-1.5505 0.9785	-0.0018 0.0702*	-0.0012 0.3598
VIX	0.0074 0.8316	0.0085 0.7464	0.0447 0.1577	-0.0069 0.9060

Source: Created by the author

Note: ***, ** and * significant at 1%,5%, and10%, respectively VIX refers to Chicago board options exchange's, OVX refers to Crude oil volatility index, MR refers to Murabaha, KSE refers to Khartoum stock market index, IN refers to Inflation rate, EX refers to Exchange rate.

OLS results suggest that the exchange rate and inflation rate have a positive relationship with the Khartoum stock market, but the effect is not statistically significant. Similarly, the Murabaha rate and the OVX and VIX variables have a negative relationship with the stock market, but their impact is also not statistically significant.

Quantile results for the second period show that at the level of Q1 there is a positive and significant relationship between exchange rate and inflation rate with the Khartoum stock

market, and a negative and significant relationship between the Murabaha rate and the stock market. The OVX and VIX variables are positively related to the stock market, but their effect is not statistically significant.

For the Q5, the exchange rate has a positive and significant impact on the Khartoum stock market, while the inflation rate has a positive but insignificant effect. The Murabaha rate and the OVX variable are negatively related to the stock market, but their impact is insignificant. Additionally, the VIX variable is positively related to the stock market, but its impact is also insignificant.

For Q9, the exchange rate, inflation rate, and Murabaha rate have positive and insignificant effects on the Khartoum stock market. The OVX variable has a negative and significant impact, and the VIX variable has a positive and insignificant impact.

3.3. Comparing Between Two Periods Results Before and After Sudan Separation

The first period exchange rate was insignificant while in the second periods had significant positive impact, for inflation rate in the first period results showed that it was insignificant while in the second period has significant positive impact on Khartoum stock markets. The Murabaha rate and OVX were insignificant in the first period while had significant impact on Khartoum stock markets in the second period,

The VIX variable was insignificant in the first period while it had negative significant impact in the second period with the stock market.

Overall, we notice that the KSE returns were impacted by global factors (VIX) during the first period (2007-2011) it means before the separation when Sudan was relatively open to the world economy while after the separation and during the second period (2011-2018) the KSE returns were impacted by the local factors (Murabaha, exchange rate and inflation). We notice that the separation had changed the performance and sensitivity of Khartoum stock markets to the different set of factors.

In the first period (2007-2011), the exchange rate was not found to have any significant effect on the KSE. This could be attributed to the fact that Sudan was relatively open to the world economy at the time and the exchange rate was not yet a major concern for the stock market. In contrast, during the second period (2011-2018), the exchange rate was found to have a significant positive impact on the KSE. This change could be due to the

separation of South Sudan and the impact it had on the economy. The new economic and political realities of the country may have made the exchange rate a more important factor in determining stock market performance. Similarly, the inflation rate was insignificant in the first period but was found to have a significant positive impact in the second period. This change could be due to the separation and the new economic realities that emerged after it. The increased focus on domestic economic factors may have made inflation a more important factor in determining stock market performance The Murabaha rate, which is a form of Islamic financing, was not found to have any significant impact in the first period. However, in the second period, it was found to have a significant impact on the KSE. This change could be due to the increasing importance of Islamic finance in the Sudanese economy, particularly after the separation. The greater focus on domestic economic factors may have made the Murabaha rate a more important factor in determining stock market performance. The OVX, or oil volatility index, was also found to be insignificant in the first period, but was found to have a significant impact in the second period. This change could be due to the increasing importance of oil in the Sudanese economy, particularly after the separation. The greater focus on domestic economic factors may have made the OVX a more important factor in determining stock market performance. The VIX, or volatility index, was found to be insignificant in the first period. However, in the second period, it was found to have a negative significant impact on the KSE. This change could be due to the increasing importance of global economic factors in the Sudanese economy. The greater focus on global economic factors may have made the VIX a more important factor in determining stock market performance. In conclusion, the study found that the impact of various economic factors on the KSE changed over time. In the first period (2007-2011), global factors such as the VIX were found to have a greater impact on the stock market, while in the second period (2011-2018), local factors such as the exchange rate, inflation, Murabaha rate, and OVX were found to have a greater impact. This suggests that the separation had a significant impact on the performance and sensitivity of the Khartoum stock market to different economic factors. Further research is needed to determine the exact nature of these changes and to understand the impact of other economic and political factors on the KSE. It is also important to understand the impact of other events and developments that took place in the Sudanese economy during this time period, such as the economic sanctions

and the conflict in Darfur. A deeper understanding of these factors could provide valuable insights for investors and policy makers. In conclusion, the results of this study highlight the importance of considering both global and local economic factors when analyzing the performance of stock markets. By understanding the impact of these factors on the KSE, investors can make more informed decisions about their investments, and policy makers can develop more effective policies to support the stock market. Overall, this research contributes to a greater understanding of the performance of the Khartoum stock market and the impact of various economic factors on it.

CONCLUSION

In conclusion, the results of this study provide evidence that changes in exchange rate, inflation rate and Murabaha rate can have a significant impact on the performance of the Khartoum stock market after separation. Moreover, the findings suggest that global factors, such as the OVX (after separation) and VIX (prior separation) variables, also play a role in shaping the stock market performance, although the magnitude of their impact may be statistically limited. These results indicate that the performance of the Khartoum stock market is influenced by a complex interplay of domestic and global factors especially after separation period, and further research is needed to fully understand the nature and extent of these relationships. Overall, this study contributes to the growing body of knowledge on the determinants of stock market performance and highlights the importance of considering both domestic and global factors in analysing stock market trends.

In addition, the results show that local macroeconomic variables in second period effect the stock market only Q1 which stock market in bearish. While WIX effect stock market Q1 (bearish period) OVX effect stock market Q9 (bullish period) in Sudan.

Based on the results of quantile regression analysis, the following recommendations can be made: Keep a close eye on exchange rate and inflation rates the results suggest that exchange rate and inflation rate have a positive relationship with the Khartoum stock market, investors and financial managers should monitor these indicators and be prepared to adjust their strategies as needed. Consider the impact of the Murabaha rate the negative relationship between the Murabaha rate and the Khartoum stock market suggests that changes in this rate could impact stock market performance. Financial managers should be aware of this relationship and factor it into their investment decisions. Monitor global factors: The results suggest that global factors such as the OVX and VIX variables can have an impact on the performance of the Khartoum stock market. Investors and financial managers should keep an eye on these indicators and be prepared to adjust their strategies as needed. Further research is needed while these recommendations are based on the results of your quantile regression analysis, it is important to note that further research and analysis may be needed to confirm or refine these conclusions. Additionally, other factors that were not included in your analysis may also play a role in shaping the

performance of the Khartoum stock market. Keep a diversified portfolio even though the relationship between exchange rate, inflation rate, Murabaha rate, and global factors on the stock market in Sudan is evident, it's important to diversify the investment portfolio. This can help mitigate the risks associated with changes in the stock market. Monitor the local and global economy the impact of global factors such as the "ovx" and "vix" variables on the stock market highlights the importance of monitoring the global economy. It is also important to keep an eye on the local economy and its economic indicators to help gauge the performance of the stock market.

Stay informed and adapt to changes: The results show that the relationship between exchange rate, inflation rate, Murabaha rate, and global factors on the stock market can change over time. Financial managers should stay informed and adapt their investment strategies as needed in response to changes in these relationships.

This research present also several limitations. First, the Data quality, the quality and availability of data used in the analysis could affect the validity of the results. There may have been missing data or measurement errors that could have impacted the results. Sample size: The sample size of the data used in the analysis may have been too small to accurately reflect the entire stock market in Sudan. A larger sample size could have provided a more representative picture of the relationship between the variables of interest. Model limitations Quantile regression is a useful tool for analysing the relationship between variables, but it has limitations. For example, it may not fully capture non-linear relationships between variables or interactions between variables. Generalizability: The results of the analysis are specific to the stock market in Sudan and may not be generalizable to other countries or stock markets. Different countries and stock markets may have unique characteristics that impact the relationships between variables Time period the results of the analysis are based on data from two specific periods, before and after the separation of South Sudan. It is possible that the relationships between the variables of interest have changed over time or that the results would be different for different time periods.

The future perspective of the effect of global and local macroeconomic factors on the stock market in Sudan will likely depend on several factors, including economic conditions, political stability, and government policies Economic conditions: The future

of the economy will have a significant impact on the stock market in Sudan. Factors such as inflation, exchange rates, and Murabaha rates are likely to continue to affect the stock market in the future. Political stability: Political stability is also a key factor in determining the future of the stock market in Sudan. Political instability can lead to uncertainty, which can negatively impact the stock market. Government policies: Government policies can also have a significant impact on the stock market in Sudan. For example, the government may implement policies that support economic growth and stability, which could have a positive impact on the stock market.

In summary, the future perspective of the effect of global and local macroeconomic factors on the stock market in Sudan will depend on a few factors and will likely be shaped by economic conditions, political stability, and government policies. A thorough understanding of these factors is important for making informed investment decisions in the Sudanese stock market. The stock market can be seen as a barometer of a country's economy, and changes in various economic indicators can affect its performance. The Khartoum stock market is no exception, and this study aims to explore the factors that shape its performance.

One of the key factors found to have an impact on the Khartoum stock market is the exchange rate. A country's exchange rate is the value of its currency in relation to another currency and can be influenced by many factors such as trade, investment, and economic stability. A change in the exchange rate can affect the performance of a stock market in several ways. For example, a devaluation of a country's currency can increase the cost of imported goods and reduce purchasing power, which can negatively impact the stock market. On the other hand, an appreciation of the currency can stimulate exports and increase foreign investment, which can have a positive impact on the stock market.

Another factor found to influence the performance of the Khartoum stock market is the inflation rate. Inflation refers to the sustained increase in the general price level of goods and services in an economy over a period. Inflation can affect the stock market in several ways, such as by reducing purchasing power and decreasing the real value of assets. High inflation can also signal an uncertain economic environment, which can reduce the attractiveness of investing in the stock market. Conversely, low inflation can provide a

stable economic environment and increase investor confidence, which can have a positive impact on the stock market.

In addition to exchange rate and inflation rate, the study also found that the Murabaha rate, a type of Islamic financing, can impact the performance of the Khartoum stock market. The Murabaha rate is a key factor in the availability of financing in the Islamic banking sector and can affect the demand for stocks in the stock market. Changes in the Murabaha rate can influence the cost of financing for businesses, which can in turn affect their ability to invest and grow, ultimately impacting the stock market.

Finally, the study also found that global factors such as the "ovx" and "vix" variables, which are commonly used to measure investor fear and volatility in global financial markets, can also shape the performance of the Khartoum stock market. The results of quantile regression suggest that these variables may have a limited impact in terms of statistical significance, but they still play a role in shaping the stock market's performance. This highlights the interconnectedness of global financial markets and the importance of considering both domestic and global factors in analysing the performance of a stock market.

In conclusion, the results of this study suggest that changes in exchange rate, inflation rate, and Murabaha rate can have an impact on the performance of the Khartoum stock market. Additionally, the results of quantile regression suggest that global factors such as the "ovx" and "vix" variables also play a role in shaping the performance of the stock market, although their impact may be more limited in terms of statistical significance. These findings indicate that multiple factors, both domestic and global, can influence the performance of the Khartoum stock market, and further analysis may be needed to determine the extent and nature of these impacts.

It is important to note that while this study provides insights into the factors that shape the performance of the Khartoum stock market, it is only a snapshot of a complex and dynamic system. The stock market is influenced by a multitude of factors, and the relationships between these factors can change over time. As such, continuous monitoring and analysis are necessary to fully understand the performance of the stock market and make informed investment decisions.

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