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Hedge, Diversifier and Safe Haven Properties of Oil and Gold Against Middle Eastern Stock Markets During COVID-19

by

Ikram Ul Haq

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This research thesis is wholeheartedly dedicated to my parents whose support and continued encouragement have been my strength and source of inspiration in all of my endeavors.

CERTIFICATE OF APPROVAL

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Ikram Ul Haq

(MMS223010)

THESIS EXAMINING COMMITTEE

S. No.	Examiner	Name	Organization
(a)	External Examiner	Dr. Hassan Raza	SZABIST, Islamabad
(b)	Internal Examiner	Dr. Jaleel Ahmed Malik	CUST, Islamabad
(c)	Supervisor	Dr. Arshad Hassan	CUST, Islamabad

Dr. Arshad Hassan
Thesis Supervisor
January, 2025

Dr. S. M. M. Raza Naqvi
Head
Dept. of Management Sciences
January, 2025

Dr. Arshad Hassan
Dean
Faculty of Management & Social Sci.
January, 2025

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Abstract

This study aims to examine and compare the diversifying, hedging and safe haven properties of Oil and Gold against Middle Eastern stock markets during COVID-19, utilizing daily return data spanning January 2000 to December 2023. The study categorizes its analysis into three timeframes: the overall period (2000–2023), pre-COVID-19 (2000–March 11, 2020), and during COVID-19 (March 11, 2020–May 5, 2023). The study employs the GARCH model developed by Baur and Lucey (2010) to evaluate the hedging and safe-haven properties of oil and gold. To ensure the robustness of the findings, the analysis is further validated using the DCC-GARCH model proposed by Bouri et al. (2017) and optimal weight allocation proposed by Kroner and Sultan (1993). Results of the study reveal that oil consistently plays a dominant role as a diversifier in all markets, with allocations often exceeding 90%, particularly during periods of heightened volatility, and exhibits strong safe-haven properties in countries like Bahrain, Egypt, Oman, and the UAE. Gold, while secondary to oil, demonstrates significant diversification benefits and safe-haven characteristics, particularly in Israel, Jordan, and Qatar, with varying weights across regions, suggesting its utility as a hedge during market turbulence. Country-specific recommendations highlight Bahrain, Saudi Arabia, Oman, and the UAE as markets where both oil and gold provide robust risk mitigation, while markets like Turkey and Egypt show less reliance on gold for diversification. Investors are advised to prioritize oil in portfolios targeting Middle Eastern markets, supplementing with gold based on market dynamics and economic factors.

Hedge, Diversifier, Safe Haven, Gold, Oil, DCC-GARCH Model, Weight Allocation

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Abbreviations

ADX	Abu Dhabi Securities Exchange
ASE	Amman Stock Exchange
BA	Bahrain All Share
BIST	Borsa Istanbul
BKA	Boursa Kuwait All Share Index
BSE	Beirut Stock Exchange
CSE	Cyprus Stock Exchange
EGX	Egyptian Exchange
MSX	Muscat Stock Exchange
QE	Qatar Exchange
TA	Tel Aviv index
TASI	Tadawul All Share Index

Chapter 1

Introduction

This research is conducted within the framework of examining the "Hedge, Diversifier, and Safe Haven Properties of Oil and Gold Against the Middle Eastern Stock Market." To minimize the potential risk it is important for the asset managers and investment professionals to construct a well-diversified portfolio including various tools of investments because it has to be efficient. This theory also states the in depth understanding and benefits of diversification. The relationship in between financial and commodity market specifically focusing on how these commodities such as oil and gold functions as hedges diversifiers or safe havens as the financial market is inherently volatile which means it keeps in fluctuating, in this environment investors are constantly in search of assets which are stable so that they can protect their investments against market downturns. It is critical to understand their properties such as variations in their value plus trend of a market and in order to manage assets while mitigating its risks also making investment strategies accordingly.

Hedging refers to a risk management strategy which is used by the investors to make an investment and then protect them from uncertainties which will reduce the chances of risk of adverse price fluctuations in an asset. This strategy includes acquiring a position in an asset which is likely to move towards the opposite direction of the primary asset whole balancing (this includes holding a position which gains value if the primary investment loss its value) the potential losses (Alexandridis, Chen, & Zeng, 2021). Foreign currencies exhibit high volatility

and tend to offer low returns due to their structural differences from global equity markets. This concept is known as "global currency hedging," where foreign currencies are held to mitigate potential risks in an international stock portfolio. This strategy also aids in reducing overall investment risk by including currencies that are negatively correlated with the assets (Cho, Min, & McDonald, 2020). To serve as hedge against stock market risk their returns must display a negative correlation of these commodities with the returns of the stock market. This negative correlation helps in mitigating losses in stock portfolios while enhancing the overall performance of the portfolio plus its stability in the market during periods of market decline (Ma & Jin, 2021).

The stock market is a complex network where publicly traded companies sell their shares to the investors and raise capital through it. The prices of stocks fluctuate over a period of time based on multiple components for e.g. the performance of a company, country's economic condition, sentiments of an investor and geopolitical factors (Chen & Zhang, 2023). Stock market is connected with hedging, diversification and safe haven as this helps to mitigate risks and maximize returns in rapidly changing financial dynamics.

Markowitz (1952) portfolio theory defined that do not put all eggs in one basket this theory clearly state that diversification is necessary for investors. In a portfolio an asset class can role as a diversifier. A diversifier is defined as an asset that is not perfectly but positively correlated with another asset or portfolio on average (Bunditsakulporn, 2022). Using a diversifier is an investing approach used to manage risk. When funds are divided across small and large companies, in both bonds and stocks the risk of having all of eggs in one basket is avoided by investor (Jiang, 2022).

A safe haven asset is an asset which retains or increases its value during the period of market stress or fluctuations plus providing protection when most other assets are drastically declining. Unlike hedge safe haven assets are particularly helping in extreme market downturns especially when other assets are losing their value (Bouri, Shahzad, Roubaud, Kristoufek, & Lucey, 2020). For oil and gold to be consider safe haven they should demonstrate a positive performance during significant stock market volatility. Financial markets and different financial instruments

have grown rapidly in both value plus its volume in recent periods. This variation has raised the uncertainties of the requirement of financial system also potentially established need for a safe haven for investors. On the other hand, the gold has been associated with the presence of a safe haven.

Oil plays a crucial part in the worldwide economy, its relationship with the financial market is a bit complex as it is influenced by multiple factors such as demand and supply, economic conditions, fluctuations in prices and geopolitical factors. For oil the empirical evidence is more complex as the studies indicates that oil's effectiveness as a safe haven or hedge relies on economic and market condition (Atil, Nawaz, Lahiani, & Roubaud, 2020). Getting an understanding of the correlation between the movement between the markets of stock and oil is significant for two key reasons the first one is that the managers of portfolio utilities this co-movement data to reduce future uncertainties which includes unfavourable fluctuations in the prices. The use of energy in order to hedge by its time varying correlations because on intricate effects of demand and supply which offers both of the properties diversification and hedging. Second most recent developments in energy policy have a huge impact on future prices which will ultimately influence the portfolio outcomes (Batten, Kinateder, Szilagyi, & Wagner, 2021).

Gold is a commodity which is historically seen as a store of value or a currency for wealth preservation especially in the time of currency depreciation, inflation and geopolitical instability. It has been observed that gold is safe to hedge as compared to other commodities. Empirical studies have indicated that gold acts as a hedge against stocks in average stability of a market whereas safe haven during extreme downturns of stock market (Mujtaba & Shahzad, 2024). Forecasting the future prices of gold holds a crucial relevance if current economic conditions are being observed due to the role of metal as a safe haven asset. Research on the relationship of oil and gold investigates to understand the role of gold as a hedge, diversifier or safe haven for the middle east market which is volatile especially under the influence of external uncertainties which includes economic variations also exchange rate volatility. By using the dynamic of correlation coefficient (DCC), this study uncovers the long-term correlation in between these commodities. It is being observed that gold can serve various roles in the market depending on its

conditions. It provides negative correlation with the prices of oil in a condition where the market is stable as a hedge, thus as a diversifier mitigating risks offers low correlation with oil which enhances its stability, and it increases or retains its value during extreme market condition as a safe haven (Liu & Zaman, 2022). One more study have identified gold as an efficient hedging strategy against downturns of stock market. It also includes the role of commodities specifically gold focusing on their potential as hedging and safe haven tools in stock market investment portfolios. The point to which oil and gold have a contribution towards its advantages remains a significant part of investigation especially in extreme market conditions. According to this study to minimize the potential risk it is important for the investors and portfolio managers to form a well-diversified portfolio including various tool of investments because it has to be efficient. This theory also states the in depth understanding and benefits of diversification.

In the context of the financial markets, the hedge, the diversifier, and the safe haven property are fundamental to the explanation of how various assets perform, especially under turbulent conditions. Both oil and gold are essential as commodities for investment portfolios pertaining to these purposes. Diversifiers are those assets that do not have a high degree of correlation with the rest implying that portfolio risk is reduced where one held diversifiers (Mensi, Nekhili, Vo, & Kang, 2021).

Safe-haven asset refers to an investment instrument the value of which either rises or remains positive when the overall market is depressed, investors use the asset as a shield during turbulent market periods. It considered as a form of insurance against inflation as well as changes in foreign exchange rates, and against most economic failure due to its high quality and scarcity. Its relevance in portfolios is usually noticed during the situations when there is an increase in the level of risk, during wars, conflicts and crises (Larmin Jr., 2022). It is pertinent to note that oil, though considered an energy commodity is also endowed with certain qualities. They vary due to political and other conflicts, supply and demand, and economic fluctuations. Compared to gold, the hedge characteristics of oil are rather relative in a sense that, depending on the circumstances, its prices may change in tandem with the economic booms (Li & Umair, 2023). Behavioural Finance offers further

insight to this by acknowledging the fact that the state of mind of the investors and other externalities do influence correlations and returns of the assets during periods, awareness of these properties is beneficial for investors who want to avoid potential losses and increase their profits in uncertain markets (Su and Li, 2020).

1.1 Theoretical Background

The pandemic disrupted global financial markets to a level that had not been seen before, thus it was novel for investors and policymakers to learn about the hedging, safe-haven, diversifier roles of critical assets such as oil and gold. When it comes to Middle Eastern stock markets, such assets bear essential functions because of the specific characteristics in the region's economy and the focus on oil exports. This theoretical framework identifies how oil and gold act as a hedge, safe-haven assets, and diversifiers when the market is under stress, specifically the coronavirus outbreak.

In fact, hedge, as a concept fundamental to hedging strategies, is based upon an asset's capacity to fluctuate inversely with another asset or market, which reduces the potential for portfolio loss. In the case of finance theory, a good hedge minimizes the portfolio risk by increasing the risk of hedging assets as a way of offsetting any losses that may occur. Thus, for their main commodity – oil, Middle Eastern economies have shown the ability to insulate against slumps in the stock markets in the past. Thus, if stock markets collapse because of some economic or geopolitical issues the oil prices rise up due to some supply issues or high demand for energy sources (Harvey & Grover, 2024). This form of inverse relationship can make investment portfolios more secure during volatile periods of the economic cycle.

Like gold, other commodities such as oil, have also been well known for hedging especially against inflation and or currency fluctuations. These are features such as the inherent value of gold and the product's long history as a form of monetary reserve. The threat of rising inflation caused by the global economic instability in the COVID-19 crisis and the extraordinary measures to stabilize the world economy taken by central banks also contributed to the increased demand for

gold. Due to the fact that gold maintains its buying power in a situation when fiat money and other assets like stocks fall, gold should be considered a reliable hedge, especially in a context of some regions, such as the Middle Eastern one where currency fluctuations are common (Wang, Nguyen Thi, & Lee, 2021).

On the contrary, concerns with their contractionary investment as their separate asset category are not recent. It stemmed from the dynamism of this investment with their risk management in their portfolio under their ever-changing financial markets forever (Arshad, 2023). Many studies are published on the relationship between the equity market and various forms of aligner investments Foglie and Panetta (2020) including gold and other metals and crude oil, to test the hedging and diversification possibilities of these (Al-Nassar, Boubaker, Chaibi, & Makram, 2023). Furthermore, according to Elsayed, Nasreen, and Tiwari (2020) there was no agreement on which members' structures received the best hedging and diversification benefits of the distinct sectors over several investment assets during their respective countries' periods.

Recent studies on gold are attributed to its characteristics in this subject (Al-Nassar et al., 2023). Many scholars stressed that the protection ability of gold has been provided not only regarding their efforts but also confronted the adverse market conditions by their role of safe-haven or hedge during their period (Arshad, 2023). The sample period also is minimally supportive evidence of gold's role in acting as a hedge or a haven in emergent economies, as stated by (Al-Nassar et al., 2023), from the prior metal higher safe haven for US equities than the other gold during various market downturn.

However, in regular market an adaption was crude oil. The short crude oil shock in 1973 Hussain and Hussain (2023), which sparked interest in understanding the relationship between their oil prices and their economy globally (Serttaş & Yaşar, 2022). Of course, the stock market has its channels by this linkage being rapidly illustrated at the sub-sectional literate to be harboured on multiple angles of crude oil stock interconnection (Al-Nassar et al., 2023). These findings especially focused on the presence of return spillovers (Yadav, Bhatia, Singh, & Islam, 2022), portfolio formation and hedging implications between the oil prices and their uncertainty. Assets were suitable for the investment from their risk to be perceived

if the assets were negatively correlated from the other assets, which positively put to the declined risk (Akhtaruzzaman, Boubaker, Lucey, & Sensoy, 2021), however, this difference between the diversified hedge and the safe heaven (Pedini & Severini, 2022). A diversifier has weaker significant correlation on average (Bossman, Gubareva, & Teplova, 2024). However, the weak, strong hedge are assets that are uncorrelated or negative correlated with another asset in the time of stress as gold has been an asset uncorrelated with stocks (Fabris & Ješić, 2023).

According to the study of Yadav et al. (2022) it would be rather difficult to make specific conclusions regarding hedging and risk diversification using the above-mentioned research, given that no specific commodity set can provide straightforward solutions (Wafula, Alagidede, Simpasa, & Nandelenga, 2022). This explained endeavour to advance the literature by examining the following dynamic relationships between the substantial price returns of the various investment tools and its daily returns on the Saudi broad market index and its constituent sectoral indices during COVID-19 and pre-COVID-19.

Over the clear distinction of the safe-haven, A hedge and a diversifier form tested whether the gold is a safe-haven asset (Liu & Zaman, 2022). However, their candidate has considered Gold over the anecdotal evidence, and the financial management with Gold, which serves as their safe haven in the financial market (Brugger & Zongo, 2023). While no theoretical models were developed then, gold was usually considered a safe haven asset (Baugi & Zhang, 2024). One of the major explanations is that it is the first form of money traditionally used in an inflation hedge.

The difference between storage and weak safe haven, not only the semantics. Still, it is also important from the evidence that an asset was negatively correlated with another asset (Bouri, Molnár, Azzi, Roubaud, & Hagfors, 2017), investors ensured their significant return to the other portfolio exhibited a negative return. This was not the case if their assets were uncorrelated. Since the signing routine of assets was during their time of financial stress Khawaja, Nawaz, and Aman (2023), they could encourage the stability of the market by eliminating overall loss, and different weak and stronger properties of assets were essential (Bossman et al., 2024).

The concepts that underlie the processes of hedging, safe haven and diversification during COVID-19 with regard to oil and gold are many and mutually connected. The characteristics of these assets, their past behavior in crisis conditions, and the general and political conditions all have their contributions. Thus, Middle Eastern investors look at the world through the eyes of oil as economy insurance and gold as the oldest hedge. The COVID-19 health crisis proved these theoretical concepts as the real-life application of strategic asset allocation and the enduring value of hedging, safe assets, and diversification in the management of risk.

1.2 Gap Analysis

Little research has been done on oil and gold in the Middle East as safe havens, hedges and diversifiers against the stock market. Gold acts as a good hedge against stock market risk in the Middle East during the pandemic, and oil acts as a good diversification tool for the stock market risk in Middle Eastern countries during the COVID-19 outbreak. It also invested in the Middle East stock market during COVID-19, and a portfolio should be created for short-term and long-term investments. It would be wise for Middle Eastern investors to invest in gold and oil in a portfolio in the stock market amid the COVID-19 pandemic. Many studies were conducted on these asset classes as their safe-haven hedge and diversifier in the distinctive literature regions are still limited to the Middle East. This research has been done on topics useful for stock investors in the Middle East. Investors need information that saves them from big losses and secures their capital through underlying concepts from their safe-haven, hedge and diversifier. This recognised developing their oil and gold properties as their safe-haven hedge, and it clads with the use of diversified for the rising of potential investors' portfolios, which seeks to compare their properties with the stock exchange of the Middle East. Oil is more complex and less well defined. Although some studies show that oil has benefits to offer when it comes to diversifying risks in the stock markets, there is controversy over the role of oil being a fundamental necessity and a financial product and that results in the mixed outcomes (Liu & Zaman, 2022). While the literature mainly explores oil price shocked effects on stock markets or stock markets volatility and

the contemporaneous hedge and safe haven, the current study seeks to contribute by analyzing the long-term characteristics of oil.

Furthermore, the evolving geopolitical landscape, technological advancements in energy production, and shifting global economic power dynamics necessitate a re-evaluation of oil's role in contemporary investment strategies (Pickl, 2019). There is another major void where integral studies of oil and gold within different market regimes, as well as within varying economic climates are missing. Although it is possible to find some analyses that include a comparison of these commodities during the financial crises, the detailed multifaceted analyses that investigate the performance of these commodities with the help of the various types of economic cycles and in connection with the indicators of both the macro economy and the micro economy are rare (Chkili, 2022). Moreover, the interplay between these commodities and other financial instruments, such as cryptocurrencies or sovereign bonds, remains underexplored.

The research aims to address these gaps by examining gold's role in the context of the Middle East stock market, during normal market conditions and the COVID-19 pandemic. Addressing these gaps requires a complex approach that incorporates advanced econometric models and real-time data analysis (Venditti & Veronese, 2020). Future works should also consider the behavior of investors, the fluctuations of the market, and its response to possible changes made to the regulations of the commodity markets. In this way, it would be useful to enhance and extend our understanding of hedge, diversifier, and safe haven qualities of oil and gold that enable investors to plan their activities and make efficient decisions concerning incertitude's and instabilities of the financial world.

1.3 Problem Statement

This research problem is to study the characteristics of oil and gold in relation to middle east stock market volatility and all these properties condition under different market situations and economical structure (Norouzi & Fani, 2020). More specifically, while the gold acting as a hedge during normal periods and as safe haven during crises, the changing nature of correlation between gold and stock

markets add a different dimension to the task falling under this category. Consequently, oil is a dual-purpose good both as an operating consumable and an investments hedge, whose efficacy for storage or safe haven cannot be evaluated definitively due to fluctuating political and macroeconomic conditions (Mensi, Shafiullah, Vo, & Kang, 2021).

While using gold and oil in a portfolio, there is limited adequate analysis as to the individual impact of these two assets or their interaction with a diversified investment portfolio. While the use of commodities reduces market risks by diversifying investments, passive investing does not take into account the possible interaction, positive or negative, between holding gold and commodities (Abid, Dhaoui, Goutte, & Guesmi, 2020). However, the total effect of other modern factors including the shift towards renewable sources of energy, revolution in technology, and shift in geopolitical risk profiles impacting the hedge as well as safe-haven qualities of oil and gold is not properly covered (Shaikh, 2021). In addition, assessing rates and returns, typical conventional methods are mostly based on empirical information that can be insufficient to provide a profound insight into a future market considering changes in investors' behaviour and rules and regulations. Markets are integrated and also globally, with the complexity of products offered in the financial market, more advanced models that involve real-time data analysis and sentiment analysis to predict asset behavior more accurately (Patalay & Bandlamudi, 2021).

To address this research problem, it would be necessary to examine how Gold and Oil as safe haven, hedges and diversifiers in the Middle East Stock Markets depending on external conditions such as periods of economic growth, war and conflicts. This involves a somewhat mechanistic approach that is embedded with qualitative analysis derived from behavioral finance to incorporating market psychology of the investors. The research aims to provide a clearer understanding of how these commodities can be strategically used to enhance portfolio resilience and performance, particularly in the face of unforeseen market shock and long-term economic shifts.

A key feature of modern portfolio theory is diversification, which includes asset

classes with low or negative correlations in an effort to reduce risk. The most important factors in investment decisions have risk or one of the faces of uncertainty is diversity (Koumou, 2020).

A comprehensive analysis of the relationship between gold and oil at various levels is needed. Global events such as pandemics and conflicts in Europe have led to significant price increases and significant increases in gold and crude oil prices Pandit and Luo (2024) to understand whether these factors can together to increase portfolio volatility or if it is more profitable when held separately Rationale can make investment decisions more informed.

This study examine the impact of gold and oil in a portfolio, providing factual information confirming or denying their attribute as a hedge, diversifier and safe haven in the Middle East.

1.4 Research Questions

In the context of the Middle East, a region distinguished by its distinct economic and geopolitical landscape, the roles of gold and oil are of particular interest to investors. Determining whether these commodities function as safe havens, hedges, or diversifiers within the Middle Eastern stock markets is crucial for developing robust investment strategies. This study aims to explore the efficacy of gold and oil in fulfilling these roles, especially during periods of financial uncertainty such as the COVID-19 pandemic. The following research questions have been formulated to guide this investigation.

Question 1. Is gold a hedge, a diversifier, and a safe haven for Middle Eastern stock market investors?

Question 2. Is oil a hedge, a diversifier, and a safe haven for Middle Eastern stock market investors?

Question 3. During the COVID-19 pandemic, can investors in the Middle East stock market use gold or oil as a hedge, diversifier, or safe haven?

Question 4. How should investors allocate resources between hedge assets and Middle Eastern stock markets.

1.5 Research Objectives

The purpose of this study to discuss hedge, diversifier and safe haven properties of oil and gold to fluctuation based on different economic conditions and regime. This research aims to address the above gaps by providing an elaborated comparative, assessment of these commodities in the context of investment portfolios.

1. To examine gold as a hedge, a diversifier, or a safe haven for investors in Middle Eastern stocks.

2. To investigate whether oil functions as a hedge, diversifier, or safe haven for Middle East stock markets.

3. To explain that oil and gold served as safe havens, hedges, or diversifiers during the COVID-19 pandemic.

4. To propose an optimal asset allocation strategy.

1.6 Research Significance

Important implications of this study for various financial market participants are investors, fund managers, financial analysts and regulators. There is increasing pressure on scholars to present strategic issues in the form of different shareholders do influence the well-being of stakeholders (DesJardine, Zhang, & Shi, 2022). Through a comprehensive examination of the characteristics of gold and oil in relation to middle ease stock market as a hedge, a diversifier, and a safe haven, this study seeks to improve the strategies of investors, and to provide a wide-ranging knowledge specifically for investors of middle eastern stocks.

Risk mitigation and return maximisation are two goals that investors and portfolio managers are continuously pursuing. More funds are devoted to active management, asset prices are more effectively priced, costs are reduced, and investors may locate managers more readily (Gârleanu & Pedersen, 2018). Their investing decisions can be directly informed by the knowledge gathered from this research, which will enable them to add gold and oil to their portfolios in a strategic manner. People can now invest in a wide range of securities and financial instruments due

to the growth of the financial markets (Hassan, Abdul-Rahman, Amin, & Hamid, 2023). Investors can better hedge against uncertainty by knowing how these commodities respond under various economic conditions, in response to geopolitical threats, and in response to technology advancements. The commodity markets for energy, industrial metals, and precious metals are the information transmitters in the commodity markets; the commodity markets for agricultural and animals are the information receivers (Gong & Xu, 2022). Furthermore, by examining the combined effects of gold and oil in a diversified portfolio, this study offers useful recommendations for improving the performance and durability of portfolios.

This study's sophisticated econometric models and analytical methods will be useful to financial analysts and scholars. Historically, economic research involves statistical methods for forecasting and policy modelling and empirically validates economic concepts (Rao, 2015). The broader discipline of financial market analysis benefits from this research because it provides more accurate forecasts of changes in gold and oil prices The research requires high quality and accurate forecasting models (Jabeur, Mefteh-Wali, & Viviani, 2024). Combining real-time data analytics with behavioural economics enables a comprehensive understanding of market dynamics. This understanding can then be extended to other areas of economic research. Furthermore, further research on commodity markets and their application in banks can be built on the results of this study.

The research findings can serve as a helpful tutorial for academies in the field of finance and economics. An understanding of the commodity market and its position in the stock markets can be gained through a comprehensive case study of gold and oil hedges, product lines and safety zone characteristics. This is significant because panic selling caused uncertainty and contagion, which in turn caused financial markets all over the world to collapse. In contrast to the earlier pandemics, COVID-19 has had a far greater worldwide impact on financial markets and the world economy (Arif, Naeem, Farid, Nepal, & Jamasb, 2022). Courses on investment strategies and financial market analysis can benefit from the use of the sophisticated econometric model concepts included in this study. This is particularly important because, in order to better understand certain economic issues, models with partially rational factors can be used. Behavioural economics

is a new approach to studying financial markets that has resulted from challenges faced by classical theories (Valcanover, Sonza, & da Silva, 2020).

The financial industry, particularly financial advisors, hedge funds and financial institutions, finds the study's practical recommendations useful. Considering that hedge funds are probably the most important type of investment in today's financial markets (Longo, 2013). This study provides comprehensive advice on adding gold and oil to portfolios, helping financial advisors improve their investment strategies and client outcomes. The creation of financial services and innovations that minimize risk and optimize returns in the face of market fluctuations can also benefit from the knowledge gained from this research.

This study aims to provide a comprehensive review of gold and oil securities, diversification, and protection against capital market volatility. If the behaviour of these securities is examined under economic conditions, geopolitics concerns, and technological advances, fill a huge gap in the literature. Oil, by contrast, presents a more complex situation because it is a dual commodity, both important and economic, and the results are inconsistent with respect to its protective capacity.

The learning challenge highlights the importance of comprehensively analysing gold and oil positions across portfolios, especially in light of market dynamics and changing financial instruments. The complex relationship between these factors and other financial products such as sovereign bonds and cryptocurrencies has been largely ignored by traditional research as well as how gold and oil react to market conditions and economic conditions species have not been thoroughly investigated. Using sophisticated financial modeling and real-time data analysis, the study seeks to close this gap and provide detailed insights into how gold and oil can improve portfolio performance and volatility. This study is meaningful to a wide range of financial market players, such as investors, fund managers, financial analysts, and policy makers. The study can provide insights into gold and oil hedges and safeguards property to assist with risk management, portfolios and investment decisions. Scholars and financial analysts will benefit from the use of sophisticated economic modeling and analytical techniques as it improves understanding of overall market dynamics and increases the accuracy of price forecasting. Policy and regulatory framework touch the commodity market. This

highlights the importance of regulatory legislation that addresses local contexts, especially in developing countries. The results of this study can be used as a learning tool for economics and finance students, improving their knowledge of financial mechanisms and commodity markets.

1.7 Plan of Study

The following study is divided into five chapters. The first chapter lays the foundation of research by providing background information on the topic and overall theoretical underpinnings. It also contains the gap, problem and why the study is significant in today's context along with the research aim, objectives and questions that the research aims to attain. The second chapter is of the literature review where the studies that have been conducted in the same domain previously are studied, critically reviewed and analyzed to observe what the past results were considering the same variables in a different context. This chapter also sheds light over the basic concepts and explanation, giving a theoretical overview of the topic under study.

The third chapter particularly discusses the research methodology explaining the sample and econometric model to be studied further. The fourth chapter discusses the results and findings from the sample. The findings are supported by literature-backed discussion which validates the claim of the author through internal as well as external sources. It helps in attaining the aim of study. The last chapter is the concluding chapter that sums up the entire research project. It provides a summary of findings, recommendations based upon those findings and their practical implications. The chapter concludes with the limitations faced by researchers and the potential for future direction.

Chapter 2

Literature Review

In the financial markets hedge and diversification comprises of spreading investments with various classes of assets and securities which helps to mitigate risks by having benefits from those assets having low or negative correlations (Mats, 2024). Equally, safe haven assets are investments which are perceived to maintain or increase their worth during market volatility. Despite the increase in research about gold and oil as assets in the Middle Eastern countries, Gold, has well served as a hedge and flight to safety, especially when the markets at the regional are under pressure (Akhtaruzzaman et al., 2021). The economic characteristics of Middle Eastern countries are quite different due to the presence of oil as a leading economic sector, so it is also a necessary tool for economic activity. the complex correlation between oil price and Middle Eastern stock exchange markets based on the basic idea that oil acts more as a portfolio investment.

Regulatory changes have a direct effect on the dynamics of supply and demand of oil and gold markets. For example, regulations concerning the regulation of energy exploration, production and circulation have an impact on oil supply prices. Likewise, norms related to gold trading, mining and storage have an impact on the dynamics of gold supply and demand. Variations in these regulations might modify and alter the perception of the market participants regarding oil and gold's property as a safe haven and hedge diversifier which affects their investment behaviour (Nguyen & Chevallier, 2020). Regulatory decisions also have an indirect influence on oil and gold attractiveness properties as hedge and safe haven assets

through their impact on wider economic conditions. For instance, modification regarding environmental policies in the energy industry influences oil price fluctuations and consequently stock market fluctuations (Nguyen & Chevallier, 2020). Regulatory indicators affecting currency market conditions or monetary policy will have an influence on the prices of gold as a hedge against inflation or currency devaluation.

Additionally, the regulatory responses regarding events related to global financial conditions can alter the sentiments, behaviour and risk perception of an investor and also impacts on the demand for oil and gold prices as safe haven assets. For example, during the time of economic uncertainty or market fluctuations/volatility, regulatory interventions intents to stabilize financial markets which may increases the appetite of an investor for safe haven assets such as gold which leads to price appreciation (Şen, 2019). There is study which talks about the COVID-19 pandemic time where gold was considered a safe haven asset but its role as a hedge and safe-haven has been debated. Research has shown diverse results, with few studies finding that gold acts as a safe haven asset during the pandemic mean while others declares that it lost its properties or was not a better choice in comparison to other assets such as Bitcoin (Akhtaruzzaman et al., 2021).

Multiple case studies have focused on the impact of regulatory changes on the market of oil and gold with its reactions with the participants of the market regarding such changes. For example, the burden of sanctions on countries and regions which produces oil might lead to supply disturbances and price fluctuations in the oil market. Variations in environmental regulations, like strictness in the standards or carbon pricing trends and mechanisms can impact the profitability of oil industries and also influence investor sentiment. In the market of gold, regulatory changes majorly related to taxation or trade regulations can have a significant implications (Li & Umair, 2023). The initiative of import tariffs on gold have disrupt the supply chains globally and have also lead to higher prices and also changes in environmental standards and mining regulations have an influence on productivity and supply dynamics and market liquidity. Market responses to regulatory fluctuations in both oil and gold markets can differ depending on the nature and scope of the guidelines. Market contributors may get ahead of

regulatory alterations and change their positions consequently, leading to price movements ahead of the operation of new policies (Mokni & Youssef, 2020). In other examples, regulatory variations may catch market participants by surprise, leading to piercing price movements and increased instability as investors react to the new data.

2.1 Gold and Stock Market

Gold is an excellent indicator of value because it has the unique characteristic of continuing to hold its purchasing power over extended periods. This characteristic makes gold a top preferred asset during the economic downturn and inflation. Jewelry gold buys usually increase when people lose confidence in the fiat monetary system and global equity markets. This inverse relationship provides the rationale for its use as an inflation and economic risk hedge and a function often associated with a safe-haven asset. Gold remains unparalleled among all the precious metals on earth as it retains significant prominence as a reserve, especially during populist periods. This behavioral attribute originates from the 'flight to quality' whereby investors buy gold while seeking safer securities (Salisu & Lawal, 2021).

Gold has always been valued due to its physical characteristics, rarity, and previous acceptance as a medium of exchange. These attributes have helped gold remain an attractive asset for people, especially during economic adversities. The status of gold also puts it in the hedge and safe haven category because in periods like the great depression, the 1970s oil crises and the 2008 financial crises, gold prices were high. Given the assessing indicators of COVID-19, we are coming out of the worse-off situation, and everything is returning to normal as countries start reopening. This fact has indicated that periods that follow a crisis tend to have high volatility and uncertainty in the financial market, which can affect other sectors of the economy. To this effect, investors will begin shifting the composition of their portfolios to mitigate risk (Kayani et al., 2024). Arshad (2023) study discusses the Middle East stock market, especially during COVID-19, and the hedge and safe haven importance of gold. Stating how gold's price movement declined proportionally to stock market returns through this period of high uncertainty,

its status as a safe-haven asset is further affirmed. This inverse relation was most prominent during the times of maximum market volatility caused by the pandemic.

Hedging and diversification between gold and stock market by Al-Nassar et al. (2023) about the stock market gold during the COVID-19 situation. According to their study, gold offered a safe haven and a good overall protector of wealth by preventing the erosion of stock market declines. This paper suggests that gold remains a vital commodity in risk management, especially in an unprecedented environment like COVID-19.

As for the role of gold as an effective hedge and safe haven, its crucial role across various countries was analyzed by (Akhtaruzzaman et al., 2021). They find that the ability of gold to hedge was more extensive in the COVID-19 crisis, given that investors shifted to save themselves from the higher risks in the market. Finally, the research also suggested that gold is indeed a safe haven in the first phase (December 31, 2019–March 16, 2020) and lost its ability of safe haven in the second phase (March 17April 24, 2020) but efficient over various markets depending on economic surrounding factors and market behavior.

Liu and Zaman (2022) study finds that gold as a hedge and safe haven has been an inconsistent asset in geographical diversification. In the S&P 500, gold exhibited a high degree of safe haven asset throughout the COVID-19 pandemic, especially when it came to insulating investments from a steep drop in the values of stocks. Nonetheless, it proved successful within different time frames and under certain market conditions, so the constant change strategy seemed more suitable for asset management.

The interaction of gold with different forms of assets and the varied economic and market conditions, including stock, bond, oil etc., inflation, exchange rate risks, etc., have been investigated where conflicting hypotheses are prevailing regarding the hedge and safe haven features of gold during uncertainties that it possibly though to deliver protective shield to investors during the adverse economic climate. Still, it exhibits ambiguous hedge and safe haven potential during uncertain scenarios (Rasheed, Ahmad, & Javid, 2021). Their permanent and nearly universal acceptance as a medium of exchange and an object of value and store of wealth, coupled with relatively stable value trajectory over long periods, leads investors

to consider gold as an asset they should have within their portfolio. Hence, gold is always recognized, especially when economic uncertainty always leads to a flight to quality in investments, which means investors opting for relatively stable investments as opposed to some risky investments. For most investors, this asset is an investment that provides owners insurance against future market losses (Vieira, Curto, & Laureano, 2023).

Gold as a safe-haven asset is in a league of its own, as no reasoning would point to gold's performance as an actual reflection of the economy's fundamentals. However, the high intrinsic value of this commodity is derived from its history as a monetary unit and standard that also conferred on it the role of a store of value. But it also removes the dangers of inflation, exchange rates and credit risk for investors (Feder-Sempach, Szczepocki, & Bogołebska, 2024). Unlike other assets deemed safe, it is not grounded on debt, which is considered the best option for those assets. At the same time, default risk is regarded concerning the pandemic-linked developments as the threat that emerged for financial stability.

Since the factors that determine the price of gold differ from those that determine the price of other financial securities, gold has always been viewed as a diversification tool, especially in stock portfolios. Based on the London gold price expressed in US dollars, most prior studies conclude that gold could be an effective hedge for an American portfolio due to its role in lowering aggregate risk and enhancing return. The above-mineral portfolio, in which gold is assigned a weight of 25%, demonstrates that the portfolio risk is decreased while the portfolio return is raised. They also point out that owning physical gold is relatively more effective than owning paper gold in diversifying risk in a portfolio. However, the gold return has been found to have a positive relation with the US stock return, which increases with time and hence reduces the diversification value of holding gold (Ghazali, Lean, & Bahari, 2020).

A global crisis such as the COVID-19 pandemic makes investors look for a safe-haven asset to invest in, and for international investors, that is gold. Specifically, (1) the influence of some of the volatility coefficients observed in various financial and commodities markets on gold prices and (2) the use of gold as an effective safe-haven commodity either before or during the onset of COVID-19 virus (Tanin,

Sarker, Hammoudeh, & Shahbaz, 2021). After the outbreak of COVID-19, this aspect is most likely to raise concerns among the following players in the economy, investors and other market players, including bank depositors.

Gold, as known, is one of the most effective indicators of economic development. It evolves with the basic constituent of the economic quantities. Gold has been regarded as a very valuable and unique metal in this world for a long time. An increase in the business trend position of KSE-100 attracts more investors to invest more capital. The economic conditions at the global level have shifted parity in favor of encouraging the high prices of gold to move further upward. In this sense, the recent regional invasion threatening Yemen to take control of Saudi Arabia may be a reason for the high price of gold to rise. The prices of gold fluctuate in general but have had a trend to rise in the last few decades. It has been pointed out that if situations in the context change, then more investment can be expected in this index (Shaique & Herani, 2016).

According to Hapau (2023), the future of gold price prediction began to skyrocket in the year 2020 due to the outbreak of the COVID-19 pandemic. That indicated that people searching for safe haven invested in gold, given the increased political risk, disruptions of the economy, and the use of Central Bank measures that had not been seen before. Gold prices rebounded while working on vaccines and changing their course in mid and late 2020-2021. This has created occasions that have experienced periods of correction, although positive vaccine news has also shaped the demand for safe havens. In the last two years, 2022-2023, The concerns of inflation realized by recovery to stimulus measures caused by the coronavirus lifted interest from the yellow metal.

As inflation was causing havoc and there were apprehensions of potential devaluation of currencies, people invested in gold. The opinion that gold may be considered a safe haven asset, especially during market downturns, is quite common. Besides some similarities, there are some differences between Bitcoin, such as its advantages over gold: It is free from the control of a country or its political and economic system; it is based on perfect algorithms and robust protocols. Thus, it will not follow commodities such as gold into the 'newfound' financialization phase, as it has not gone through the preceding phase. Such properties suggest

that it makes sense to compare the safe-haven status of bitcoins to that of gold (Wen, Tong, & Ren, 2022).

By considering the research of Bhatti, Jamali, Khokhar, and Buriro (2023) that included a thorough assessment of how COVID-19 affected Middle Eastern stock markets, the role of gold in diversifying the portfolio and, consequently, lowering the portfolio risk was supported. The study's results proved that during higher uncertainty, the correlation between gold and most benchmark equity indices in the region is significantly low, thus supporting the role of gold as a hedge asset. The analysis revealed that the independence of gold from the global market trends during the pandemic was a major concern, imparting protection from significant drawdowns to equity investments.

Baur and McDermott (2010) provide definitions for "hedge" and "safe haven" and evaluate gold's effectiveness in these roles through an analysis of daily data spanning 1995 to 2005. Their research centers on gold's function as a safe haven during times of heightened stock market volatility, showing that gold tends to retain its value during significant stock market downturns in the US, UK, and Germany. They find that gold can act as a safe haven for approximately fifteen trading days in such periods. Expanding on this topic, Baur and McDermott (2010) analyze a 30-year period ending in 2009, focusing on both emerging and developed markets. Their results reveals that, while gold does not consistently act as a hedge or safe haven for emerging markets like the BRIC countries, it does fulfill these roles for US and major European markets. Gold has historically shown stability in economic downturns, as seen in its 5% rise by the close of the 2008 financial crisis.

Research shows differing views on gold's capacity to preserve wealth during periods of financial uncertainty. Baur and McDermott (2010) provide evidence suggesting that gold can act as a safeguard, though their findings suggest this effect is only temporary. Mensi, Al-Yahyaee, Vo, and Kang (2021), using a VAR-GARCH model to analyze return linkages between the commodity index and the S&P 500, conclude that gold does not function as a safe haven or hedge in these markets based on daily price data from 1997 to 2013. Similarly, Alqahtani and Klein (2021), applying a dynamic correlation model, find that although gold once served as a

hedge for the US and European stock markets, this role appears to have weakened after 2013.

Using daily data from 2007 to 2020, this study discovers that, with the exception of the Sharia Malaysia index, US investors, whether Islamic or conventional, can achieve significant diversification benefits with major trading partners (the UK, Canada, China, Japan, Malaysia, and Turkey) for very short investment horizons (4–8 days). With the exception of China, these advantages decrease over longer time spans (8–16 days and beyond). The COVID-19 pandemic significantly curtailed prospects for diversification. The UK and Canada appear as possible market leaders across different periods, and the US industrial industry is getting closer to perfect market integration (Attia, Aly, ElRawas, & Awad, 2023).

Mensi, Maitra, Selmi, and Vo (2023) focused on the experience of the Middle Eastern and North Africa (MENA) stock markets and the diversifying potential of gold during the COVID-19 crisis. It was concluded in the research that gold has a bearish market with oil prices, and the regional stock indices where it is being invested cannot be ignored. This was especially so given that several Middle Eastern countries that heavily rely on oil revenues received severe setbacks in their oil prices during the period under consideration. When utilizing gold as a safe haven, investors should exercise caution and think about rebalancing their portfolios in the current position of markets.

This study investigates the safe-haven properties of various assets against key Gulf Cooperation Council (GCC) stock indexes across two financial crises: the COVID-19 pandemic and the 2008 Global Financial Crisis (GFC). Utilizing a bivariate dynamic conditional correlation (DCC) GARCH model, the findings reveal that sovereign bonds provided the most reliable hedging benefits in both crises. During the pandemic, traditional safe-haven assets like gold and silver did not perform as effectively as they did during the Great Recession. The Japanese yen proved to be an exceptionally safe asset for investors with GCC stock holdings. Overall, sector and stock indexes offered limited protection in either crisis (M. K. Hassan, Djajadikerta, Choudhury, & Kamran, 2021). Terraza, İpek, and Rounaghi (2024) examined the propagation of COVID-19 caused a drop in metals, energy, and stock index prices, which in turn caused global financial turmoil. As a result,

investors were counseled to switch to safer investments including gold, cash, real estate, and the increasingly well-liked cryptocurrency assets. This research uses an artificial neural network and a DCC-EGARCH model to predict market volatility and looks at how major U.S. stock indices (S&P500, Nasdaq, and Dow Jones) performed before and during the epidemic. It also looks at the behavior of Bitcoin and gold. According to the research, there is a significant relationship between the stock market, gold, and bitcoin. Bitcoin offers greater portfolio diversification and risk management, lowering risks during the COVID-19 pandemic.

In the volatile and unpredictable market, investing in gold and oil is the best way to manage the risks, which can help prevent investment value from dropping. However, the general commodity prices affected by demand and supply during volatilities influenced by the financial crisis is inevitable, including the price of gold (Bai & Ho, 2022). Demand, supply, and shocks can all significantly enhance the volatility of oil commodity prices, as the COVID-19 pandemic epidemic demonstrated. Additionally, oil has historically been employed in portfolio optimization techniques as a risk diversifier. For a considerable amount of time, gold has been perceived as an asset that provides investors with a safe haven in times of economic and financial volatility.

This study is reinforced by the Spillover Index proposed by (Diebold & Yilmaz, 2012). The three hedging assets and the stock indices have a very low total static connectivity (around 9% for the three indices). The entirety of any system's connectivity is mostly a relatively transient phenomenon. This implies that each type of stock investor can profit from diversification through the three hedging assets, particularly over longer investment horizons. For all three categories of equity investors, the three possible safe-haven assets gold, crude oil, and Bitcoin, offer hedging capabilities for varying investment horizons. More evidence is needed to validate their function as a safe-haven asset in the current COVID-19 situation, nevertheless (Disli, Nagayev, Salim, Rizkiah, & Aysan, 2021).

This study of Tronzano (2022) emphasizes that safe haven value of gold in international stock portfolios, but it also demonstrates that gold's hedging performance is not as strong as that of the Swiss Franc. Although gold has historically been seen as a hedge against market fluctuations, the study's conclusions indicate that,

over the past 20 years, gold's capacity to reduce risk in stock portfolios has diminished. Value-at-Risk (VaR) simulations and multivariate analysis are used to demonstrate that portfolios hedged with gold have less defensive qualities than portfolios hedged with the Swiss Franc. This research suggests that although gold has historically been regarded as a safe haven investment, its usefulness may be restricted when compared to other currencies such as the Swiss Franc in a multivariate asset framework.

This study demonstrates that the stock market is significantly impacted by gold prices. It advises investors to think about holding gold since it can increase returns and help preserve asset values, particularly in periods of rising inflation. According to the report, gold investments are a useful tactic for reducing inflation and safeguarding wealth. Nevertheless, the study was constrained by the data's accessibility, and the small sample size precluded the application of structural break tests. Notwithstanding these drawbacks, the research provides insightful information to investors who want to diversify their holdings by purchasing gold in addition to stocks and oil (Batool, 2020).

This paper's findings related to gold show that, in typical market circumstances, there is no meaningful relationship between platinum and gold. Furthermore, no particular results regarding the efficacy of gold as a hedge or its spillover effects in relation to other precious metals, including palladium and platinum, are highlighted in the article. This implies that gold does not display a high correlation with oil in the contexts studied, despite other precious metals showing differing degrees of correlation. This supports gold's traditional status as a safe haven asset under various market scenarios (Mensi, Mishra, Ko, Vo, & Kang, 2024).

According to Salisu and Lawal (2021) paper's findings, gold is a substantial safe haven against risks associated with the price of crude oil, especially throughout the study period (January 2016 to August 2020). The asymmetric VARMA-GARCH model's application validates gold's efficacy in reducing the risks connected to fluctuating oil prices. Gold's effectiveness as a hedge against the risks associated with oil prices is further supported by the results of optimal portfolio and hedging calculations. Comparisons with other precious metals, including silver, platinum, and palladium, support the robustness of these findings, indicating that gold is

a dependable asset for portfolio rebalancing in the face of turbulent oil market conditions, such as the COVID-19 epidemic (Salisu & Lawal, 2021).

Another study's findings suggest that, in the majority of Asian economies, aside from Korea, Singapore, and Thailand, where its function as a hedge is more pronounced—gold acts as a diversifier versus equities. Except for China and Hong Kong, the study concludes that gold serves as a safe haven and hedge against Asian currencies. This emphasizes gold's ongoing significance in these areas for wealth preservation and controlling currency-related risks, hence reiterating gold's monetary role throughout Asia (Aftab, Shah, & Ismail, 2019).

This study finds that in Saudi Arabia, gold serves as a hedge against inflation as well as a portfolio hedge. Gold is a dependable inflation hedge because, according to the autoregressive distributed lag (ARDL) model research, the Consumer Price Index (CPI) has no effect on it. The research also emphasizes how gold might lower investment risks during financial crises because outside variables like market turbulence can affect the CPI. Furthermore, the results imply that including gold in an investment portfolio can lessen risks during periods of market volatility, hence enhancing its hedging capabilities. The study comes to the further conclusion that policies meant to limit the import of gold might not be successful and that it would be better to deal with the underlying causes of inflation and offer substitute investment opportunities in order to lower the import of gold (Shakil, Mustapha, Tasnia, & Saiti, 2018).

Middle Eastern economies especially the of the Gulf Cooperation Council (GCC) are greatly determined by the oil prices. Increased volatility in oil prices affects the government balance of revenues and expenditures, economies' growth and investors' attitude (M. Hafner, Raimondi, & Bonometti, 2023). Low oil prices, as observed at the inception of the COVID-19 pandemic, lead to high economic risk, through the safety mechanism gold becomes more desirable. Banks and other investors use gold as a hedge against their wealth that is being potentially hurt by lower oil prices and volatility that comes with it.

Another essential factor that affects the performance of gold in the Middle East is geopolitical tensions. The area attracts many conflicts such as civil wars, international conflicts and political instability. These tensions can prompt political

and/or economic crises that make local and international investors turn to the safety that gold offers. For instance, when there was increased political tensions between Iran and the United States at the beginning of 2020, the price of gold went up given that there could be widespread conflict in the Middle East.

In this paper, a time-varying parameter panel vector error correction model is applied to panel data from 15 countries (2009-2020) to investigate the dynamic hedging properties of gold against exchange rate volatility. By taking into account the dynamic character of foreign exchange risk hedged by gold, it closes a gap in the literature. Important conclusions include the following: (1) gold can partially protect against long-term currency depreciation; (2) it is useless for short-term exchange rate risk hedging; and (3) gold reacts reversibly during unexpected shocks, providing a safe haven for foreign exchange markets. Investors and governments alike should create plans to control these changing risks (Wang et al., 2021).

Conover, Jensen, Johnson, and Mercer (2010) build on previous research, providing fresh insights into the advantages of incorporating precious metals into U.S. stock portfolios. They identify five key conclusions regarding direct investments in precious metals through commodities versus indirect investments via shares. First, a 25% increase in allocation to equities of precious metals firms significantly enhances portfolio performance. Second, evidence suggests that indirect investments in precious metals outperform direct investments. Third, gold offers a stronger hedge against inflationary pressures and outperforms platinum and silver individually. Fourth, there is a direct relationship between the economic climate and the benefits of precious metals. Finally, despite considerable fluctuations, the advantages of adding precious metals to an investment portfolio were evident throughout the 34-year period.

Ibrahim and Hamid (2011) expand on the literature by examining the potential benefits of gold investment for Malaysian investors, specifically in terms of diversification, hedging, and safe haven benefits. The results indicate that investors in the Malaysian equities market can, at most, use gold as a diversifier. They also note that, in light of current global financial difficulties, the role of gold as an investment route has changed. Furthermore, gold's function tends to be diminished by the harsh market conditions, becoming merely a diversifier.

Ghazali et al. (2020) study seeks to evaluate gold's protective value against stock market declines across five countries. The findings indicate that gold serves as a strong diversifier for Chinese equities and a reliable hedge for U.S. and Indian stock markets. Gold remains a popular investment as a safe haven, particularly in India, where it holds significant cultural value, as well as in the U.S. and the U.K. However, in developing countries like Malaysia, gold's influence is notably smaller. In India, beyond cultural and social sentiments, there is a substantial demand for gold due to the perception that it is not solely reliant on macroeconomic factors and business cycles, allowing investors to preserve capital during economic downturns and recessions. Conversely, gold is primarily attractive to British investors during stock market declines.

2.2 Oil and Stock Market

The relationship between oil prices and stock market movements is influenced by multiple factors such as dynamics of supply and demand, macroeconomic indicators and geopolitical events on the prices of the commodity. While different studies consistently have evidence of the correlation of stock market indices with oil prices, the volatility and direction of this correlation depend on and vary over time and different market conditions. When there is a variation in the prices of oil this has a significant implication for macroeconomics because it influences the purchasing power of a customer then eventually their spending, earnings of a corporation also overall economic growth consequently affecting decision-making strategies and market performance of an investor (Ji, Zhang, & Zhao, 2020). By accepting the time-varying dependence between stock returns and oil prices, researchers can enhance themselves in forecasting models plus enhancing their accuracy and reliability of predictions in the financial markets.

The comprehensive framework of safe haven assets and hedge diversification offers a lens through which investors understand the function of oil in investment portfolios. Hedge diversification includes spreading of investments across various asset classes to mitigate overall risk of the portfolio. The aim is to invest in assets with low or negative correlations with each other because when one of the asset's

performances is not up to the mark the other with a better performance can offset its loss. Historically oil is considered as potential hedge, diversifiers because of its unique features, characteristics and behaviours in response to market volatility (Kehinde et al., 2023). Conversely, safe haven assets are the investments which are perceived to maintain or increase the value of assets during times of market volatility it provides stability and preserves the wealth of the investors who are seeking escape from uncertainty.

The hedging and safe-haven functions of clean (renewable) and unclean (non-renewable) energy equities are contrasted in the article presented by (Azad, Hayat, & Ahmed, 2024). Even during the epidemic, it finds that both clean and dirty energy stocks offer inadequate hedging and safe-haven qualities against uncertainties in global economic policy. This is determined by using 20 years of data and applying GARCH and quantile regression models. Interestingly, renewable energy companies exhibit resilience against unfavorable changes in economic policy and market volatility, indicating that they could be a valuable hedge for investors.

Robiyanto, Nugroho, Handriani, et al. (2020) looks into how well oil, gold, work as equity hedges in the ASEAN-5 (Indonesia, Malaysia, Singapore, Thailand, and the Philippines). After applying techniques such as DCC-GARCH and Markowitz optimization, it concludes that gold is a more economical hedge than oil, which is pricey in the ASEAN-5 nations. The study suggests that in terms of risk-adjusted performance and efficacy of hedging, oil is less appealing than money market instruments and gold, particularly for investors who are risk averse. Diversification into Philippine stocks is advised for portfolios with exposure to oil.

In order to find the best hedge ratios and portfolio returns, the of Batten et al. (2021) study uses the Dynamic Conditional Correlation (DCC) approach to assess the viability of hedging equities with oil. The results show that although oil hedging has obvious financial advantages, its efficacy fluctuates with time and market circumstances. Notably, hedging ratios rose during the Great Financial Crisis (GFC), increasing their efficacy. Because excessive volatility during times of global financial instability affects hedge returns, the implied volatility index (VIX) becomes important. Furthermore, returns are adversely affected by a stronger US dollar relative to the euro, but after the Great Financial Crisis, the performance

of hedge funds may now be better explained by the price of gold and the term spread.

With a focus on five significant oil-exporting nations and six significant oil-importing nations, the study presented by Degiannakis, Filis, and Panagiotakopoulou (2018) investigates the functions of crude oil as a hedge, diversification, and safe haven for different currencies. The study reveals generally low or negative correlations, especially during crises, using the Asymmetric-DCC model to examine time-varying correlations. For the main currencies, crude oil fulfills different safe-haven and hedging roles, according to the quantile-based regression paradigm. These results are corroborated by additional data from the cross-quantilogram framework. According to the out-of-sample analysis, oil offers better diversification benefits and is a more effective hedge for countries that export oil during bear market situations. Implications for investors, portfolio managers, and legislators are also covered in the paper.

Naeem and Kang (2022) Uses quantile-on-quantile regression (QQR), this research investigates the safe-haven and hedging potential of gold and oil against industrial metals and agricultural commodities. Pre and post global financial crisis (GFC) data, spanning from January 2000 to December 2018, is analyzed in this study. The results show that, before to the GFC, oil and gold had weaker connections with metals and agricultural commodities. According to the QQR model, oil used to be a safe haven for these commodities but lost it during the Great Financial Crisis. Furthermore, the analysis demonstrates that, prior to the Great Financial Crisis, oil was a more effective hedge than gold.

Zorgati (2023) Uses the C-Vine model, this study investigates Brent Crude Oil's ability to hedge against the currencies of both oil-importing and oil-exporting nations. The results show that during the sample period, there was a negative correlation between Brent Crude Oil and all currencies, especially during the COVID-19 outbreak and the Russian invasion of Ukraine. The data backs up Brent Crude Oil's position as a safe haven and buffer against big currency swings. More specifically, in both oil-importing and oil-exporting nations, increases in Brent oil prices are linked to currency depreciation versus the US dollar. The study shows that an increase in oil prices usually corresponds with an increase in the value of the

dollar. The Russian currency and Brent crude oil showed an atypically strong positive link during the crisis between Russia and Ukraine. However, the study comes to the conclusion that oil is a weak hedge and safe haven against the Russian ruble.

For instance, oil is a significant input in the mining industry, and as stated, when oil prices rise, the amount of money available to mining firms declines, thus minimizing their stock market values (Mensi, Al-Yahyaee, et al., 2021). This is indicative of the dependence structure between commodities and the stock market, this may be due to the financialization of commodities which happened at the onset of the year 2000 (Hu et al., 2020). The spectacular advancements in this area have attracted the attention of investors and policymakers and as a result, the investment demand for these commodities has risen (Farid & Sirriyeh, 2022). Kumar and Singh (2022) argued that co-movements in the various commodities are exaggerated by the impacts of the same macroeconomic factors that affect all the markets for commodities. Crude oil–bearing precious metals' prices acting to crude oil price instigates further volatility on the commodity prices Umar, Gubareva, Naeem, and Akhter (2021), increasing uncertainty in the crude oil commodity market leads to holdings in safe precious metals.

The information transmission from oil to stocks has been the subject of much empirical study conducted by Maghyereh and Al-Kandari (2006) but the impact of OPEC news and oil volatility on herding in these markets has not been studied. Changes in the oil market are news to investors in domestic equities markets in oil-producing nations, therefore the oil market is watched. Increases in oil prices are predicted to initiate business cycles, which will have a big impact on returns and equities prices. It is crucial to observe whether news and oil market volatility can cause herding in the equity markets of nations that produce oil. The results of these tests have an impact on asset allocation between oil and the stocks of nations that export oil, as well as global diversification.

This study of Ali, Mensi, Anik, Rahman, and Kang (2022) uses continuous wavelet transformation modeling and dynamic conditional correlation multivariate GARCH to investigate the time-varying link between oil prices and India's disaggregated stock market. The results suggest that this link has changed over time, exhibiting

erratic correlations prior to the financial crisis of 2007–2008. Correlations have since turned positive, suggesting that investors do not profit from diversification during times of high oil prices. This study suggests that the government should rely more on alternative energy sources given India's increasing proportion of the world's oil consumption, particularly in oil-intensive industries. Additionally, the study recommends that monetary policy should be flexible to control inflationary pressures brought on by oil price volatility in order to lessen the negative consequences of rising oil prices through the exchange rate channel.

The study began by exploring the partial influence of COVID-19 on the diversification benefits of the role of oil decline Mensi, Nekhili, et al. (2021) examined by the hedging provider of oil during the COVID-19 pandemic. These findings suggest that while oil continued to offer some diversification benefits, its efficiency has been diminished in terms of collision with the stock market due to extreme volatility.

Al-Nassar et al. (2023) did a study on the resilience of oil as a hedge and a safe haven asset during market uncertainty and particularly the one that sprung from the COVID-19 pandemic in the Middle East. Their empirical study revealed that oil prices moved fairly in an inverse direction when it came to regional stock markets particularly during severe declines. This negative co integrates with the uses of oil as a hedge and safe-haven asset for investors in view of financial shocks as risk management tool.

Specifically, Yu, Guo, and Chang (2022) looked at how oil prices were related to stock market fluctuations in the major oil exporting nations. Among them the fluctuating oil prices were found to act as a hedging factor in case of the risk in the stock market, especially among countries that export a significant proportion of their products as oil. This protective characteristic was most and especially equally seen especially during the periods of increased market risks like the recent COVID-19's period where the oil prices acted as stock prices, market hedges.

This study examines the co-movement of the oil and stock markets in oil-exporting African nations using the quantile regression approach. Daily data on OPEC crude oil prices and stock market indices for Egypt, Ghana, Morocco, Nigeria, South Africa, and Tunisia are used. The study runs from January 2, 2020, to

May 6, 2021. The results show that crude oil does not provide a safe haven for these countries' stock markets; in fact, the stronger co-movement during market downturns is indicated by the oil-stock co-movement being more prominent at the lower tails. Consequently, instead of depending on oil as a safe-haven asset, investors are advised to use it as a tool for diversification. According to the report, in order to lessen the negative effects on stock markets, policymakers should put policies in place to stabilize the crude oil markets and lower volatility, especially during emergencies like the COVID-19 epidemic. These results offer insightful information to investors and policymakers in African economies that export oil (Assifuah-Nunoo, Owusu Junior, Adam, & Bossman, 2022).

Nandelenga and Simpasa (2020) explored the relationship between oil prices and currency markets and examined the co-movement of oil price and currency market. As the study pronounced, oil prices were effective in insulating countries, especially those exporting oil against other particular currencies in the global market. When currency markets in the aftermath of the pandemic induced economic disruptions, remained relatively volatile, oil was an important hedge against a fluctuating currency that could adversely affect the economy.

Ali, Azmi, and Khan (2019) used consideration to matters of diversification when investing in oil. The research revealed that the correlation coefficients were high and this stated that oil provided significant diversification benefits because oil looked to move in a manner that was uncorrelated with conventional financial investments for instance equities and bonds. As we saw during the pandemic period when various conventional forms of investment had high levels of price fluctuations, the benefits of crude oil instruments emerged through the level of diversification that they brought to investment portfolios.

Mugaloglu and Dogan (2021) looked at how oil price shocks affected investments in an investment portfolio. The study they came up with revealed that the addition of oil stocks to diversified baskets lowered total risk and elevated returns. This was especially relayed during the COVID-19 outbreak because oil had the characteristic of offering a safety net from deep losses within the overall risk-reward models of investment, thus enhancing portfolio stability. This research examines return and volatility spillover between the COVID-19 pandemic, crude oil market, and stock

market using the time-varying based approach by Diebold and Yilmaz (2012) and frequency dynamics by (Baruník & Křehlík, 2018). It reveals that return spillovers predominantly occur in the short term, while volatility spillovers extend into the long term. Moving window analysis indicates that COVID-19 introduced unprecedented risks, resulting in rapid losses for investors evidenced by sharp declines in oil prices and repeated circuit breakers in the US stock market. Notably, COVID-19's impact on oil and stock market volatility surpasses that of the 2008 financial crisis (Zhang & Hamori, 2021).

The study by Abuzayed and Al-Fayoumi (2021) explores the impact of severe oil price tail risks on Gulf Cooperation Council (GCC) stock markets, examining changes before and during the COVID-19 pandemic. Using three risk metrics Conditional Value at Risk (CoVaR), Delta CoVaR (CoVaR), and Marginal Expected Shortfall (MES) estimated via a DCC-GARCH model, the research reveals significant oil price risk spillovers to GCC stock markets, with a heightened impact during the pandemic. Analyzing daily data from January 2017 to May 2020, the study shows that Saudi Arabia faced greater exposure in the pandemic's early stages, while all GCC markets became increasingly susceptible later, with Saudi Arabia and the UAE most affected. These findings suggest that investors should adopt dynamic portfolio diversification and that policymakers should implement strategies to mitigate adverse effects tied to oil-related risks.

Melki and Ghorbel (2023) study looks into whether market risks may be effectively reduced by hedging emerging Eastern European stock markets with commodities sectors, and whether this efficacy changes depending on the sector. Three types of MGARCH models are used to describe dynamic conditional correlations, optimal hedge ratios, and hedging efficacy for each bivariate series in order to solve this: DCC, ADCC, and GO-GARCH. For out-of-sample projections from December 1994 to June 2022, a rolling window approach is employed. The results show that the best hedging instruments for these markets are the energy and industrial metals sectors. Furthermore, the GO-GARCH model yields a different hedge ratio than the DCC and ADCC models. It is demonstrated that the best model to estimate the efficacy of hedging is the ADCC model. Aziz (2023) investigates and analyzes the interaction between oil prices and stock indices: the experience of SAARC

countries. The analysis showed that oil prices in most regions remained either at a negative or low association with the stock markets during the pandemic, thus, supporting the oil diversification effect. The conclusion drawn from the research was that investment diversification through the addition of oil benefits investors as the asset has the utility of risk dampening especially in the volatile market.

Another study employs both the conventional Markowitz (1952) technique and a more recent approach by Hatemi-J, Roca, and Mustafa (2023), which focuses on optimizing risk-adjusted returns, to reexamine the importance of oil as a diversification asset in investment portfolios. The asymmetric interaction between oil, equities, and bonds is studied in order to evaluate portfolio stability. The results show that oil still contributes to diversification even though it has no effect on bond movements, either positive or negative. Oil does, however, have an impact on equities, especially during downturns, and it has the ability to destabilize a bond and stock portfolio. By explicitly mixing risk and return, this research provides fresh insights into portfolio optimization and important information for investors, financial institutions, and policymakers (Hatemi-J et al., 2023).

Yousaf, Arfaoui, and Gubareva (2024) examine return and volatility transmission between the US equity and oil sectors is examined in this study for three different time periods: pre-COVID-19, COVID-19 pre-vaccination, and COVID-19 post-vaccination. The findings show that these stages have different return and volatility spillovers, with the post-vaccination phase having the largest return connectivity. The pre-vaccination period of COVID-19 is when there is the most volatility spillover from US equity sectors to the oil market; during COVID-19, there is minimal volatility transmission from oil to US equities. In the post-vaccination phase, investors should lower their exposure to US shares in the oil-equity sector portfolio, according to optimal weight estimations. Moreover, during this recovery phase, hedging efficacy is at its peak and costs are at their lowest. For investors and portfolio managers, these findings provide important insights for predicting, hedging tactics, and portfolio diversification during health crises and recovery periods.

Furthermore, because oil's price movement relative to traditional financial assets like equities or bonds is either weak, or inversely related, it is a good safe haven in investment portfolios. This property is especially valuable at low volatility state

because there used to be high correlation between classical investment categories available to investors (Abu, Hassan, Khan, & Pervin, 2023). Thus, by investing in oil-bearing companies, investors can increase their overall return and at the same time minimize risks of the portfolio.

Several empirical stock market studies have revealed that the integration of oil in diversified portfolio helps in improvement of portfolio return with lower level of risk (Pham, Thac, Do, & Vo, 2023). It was also seen during the COVID-19 pandemic where integrity ascendance was seen eradicating traditional asset procurement and thus providing diversification. Some investors with oil in their basket confirmed this narrative that oil has acted as a defensive tool, cushioning portfolios against deep losses.

This finding supports the argument that oil provides an effective hedge during periods of volatility. However, like any other commodity, the stability or the role that oil can provide as a safe haven, hedge, or diversifier is influenced by the market structure and investors' behavior. Shehabi (2022) have acknowledged that in the GCC countries where the economies have traditional reliance on oil incomes, oil prices tend to have deeper effects on the financial markets. This means that in as much as oil can help diversify the sources of Foreign Exchange Earnings Chen and Zhang (2023), it also comes with numerous risks, especially during global shocks, as illustrated by the COVID-19 shock.

Based on the findings, asset diversification as an effective strategy for Middle Eastern markets during the COVID-19 pandemic would prove useful in exploiting oil and gold roles (Al-Nassar et al., 2023). In the short run, it would be advisable to stick more to gold because its performance in safe-haven assets is good (Mensi et al., 2024). The fear is that non-oil imports consume all the foreign exchange earnings, leading to underinvestment in oil, implying holding a large proportion of foreign exchange earnings as oil can be useful in the long run, given its hedging capabilities (Alharbi, 2020). This approach also prevents concentration within specific areas, reducing measures of risks and improving portfolio stability during economic volatility.

There are foreseeable approaches in the preliminary stages of an optimal asset allocation strategy during the COVID-19 pandemic; it is prudent to appraise the

hedging effectiveness (HE) and the risk-minimizing hedge ratios (Tronzano, 2022). The studies mentioned show that one must identify investments that would allow for allocating a considerable portion of portfolios to oil to hedge on risks. For instance, during the pandemic, the ideal proportion of a portfolio dedicated to oil might go up to 90%, with the rest invested in stocks (Jussi-Pekka & Grundström, 2023). They allocated them in a manner that optimized the hedging and minimized the risks associated with it. During the uneasy market times, including the deleveraging crisis in 2020 due to coronavirus, the diversification with oil contributed to enhancing returns and the portfolio's vulnerabilities (Affinito & Santioni, 2021). The two annexed studies emphasize that, regarding oil as a hedge, the results align with the literature regarding other crises, like the GFC, exhibiting different trends due to the structure and characteristics of the COVID-19 crisis.

2.3 Hypothesis of the Study

H1: Gold is a diversifier, a hedge or a safe haven for Middle Eastern Stock Markets.

H2: Oil is a diversifier, a hedge or a safe haven for Middle Eastern Stock Markets.

H3: Gold or Oil serve as diversifier, a hedge or a safe haven for Middle Eastern Stock Markets during COVID-19.

Chapter 3

Research Methodology

This section outlines the study's sample, data range, and the econometric model employed to assess the role of gold and oil in relation to the stock markets of Middle Eastern countries.

3.1 Population and Sample of Study

The sample of the study includes the price index of Brent oil, gold, and the stock markets of the Middle East countries from 1st January 2000 to 31st December 2023.

The Middle Countries include the following Seventeen countries — Bahrain, Cyprus, Egypt, Iran, Iraq, Israel, Jordon, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirate and Yemen.

Five counties has been dropped form the sample due to not availability of data the following countries are Iraq, Syria, Palestine and Yemen due to war conditions and Iran due to sanctions. The countries, country specific indices and the time frame mentioned in the table below

TABLE 3.1: Population and Sample of Study

Countries	**Indices**	**Time Period**
Bahrain	Bahrain All Share	May, 2010 to Dec, 2023
Cyprus	CSE	Jan, 2000 to Dec, 2023
Egypt	EGX30	Jan, 2000 to Dec, 2023
Israel	TA90	Feb, 2001 to Dec, 2023
Jordon	ASE All Share	Oct, 2000 to Dec, 2023
KSA	TASI	Jan, 2000 to Dec, 2023
Kuwait	BKA All Share	Dec, 2012 to Dec, 2023
Lebanon	BSE	Jan, 2000 to Dec, 2023
Oman	MSX30	Dec, 2000 to Dec, 2023
Qatar	QE	Mar, 2001 to Dec, 2023
Turkey	BIST100	Jan, 2000 to Dec, 2023
UAE	ADX	Jul, 2001 to Dec, 2023

The formula applied to calculate the natural log returns for Brent oil, gold, and stock market returns is as follows:

The formula for the return is:

$$R_t = \ln\left(\frac{p_t}{p_{t-1}}\right)$$

Where

R_t = Represents the continuously compounded return for Brent oil, gold, and stock markets.

ln= Natural Logarithm

p_t= Denotes the price or index of Brent oil, gold, and stock markets at the current time period "t".

p_{t-1}= Represents the price or index of Brent oil, gold, and stock markets in the previous period "t-1".

3.2 Econometric Model

This section presents the econometric models to analyze the safe haven properties of gold and oil used by (Baur & Lucey, 2010).

It is also assumed that gold and oil prices depend on stock market fluctuations, with this relationship being variable and influenced by extreme market conditions.

Equations 3.1, 3.2, and 3.3 provide the GARCH model to examine the safe haven properties of gold and oil.

$$r_{\text{Gold or Oil},t} = \alpha + \beta_t r_{\text{Stock},t} + \varepsilon_t \tag{3.1}$$

$$\beta_t = c_0 + c_1 D(r_{\text{stock},q_{10}}) + c_2 D(r_{\text{stock},q_5}) + c_3 D(r_{\text{stock},q_1}) \tag{3.2}$$

$$h_t = \pi + \alpha \varepsilon_{t-1}^2 + \beta h_{t-1} \tag{3.3}$$

Equation (3.1) captures the relationship between returns on gold/oil and stock returns, with parameters and bt to be estimated. The error term in this model is represented as et.

The parameter bt follows a dynamic process defined in Equation (3.2), with parameters c0, c1, c2 and c3 needing estimation. Dummy variables, denoted as D(...), are used to represent extreme stock market movements; they take a value of one when stock returns exceed specific thresholds at the 10%, 5%, and 1% quantiles of the return distribution.

If any of the parameters c1, c2 or c3 are significantly different from zero, this implies a non-linear association between gold and stock returns or between oil and stock returns. If these parameters are non-positive, it indicates that gold/oil serves as a weak safe haven for the relevant market.

Negative and statistically significant values for these parameters suggest that gold/oil acts as a strong safe haven. Gold/oil functions as a hedge c0 is zero (indicating a weak hedge) or negative (indicating a strong hedge).

Lastly, Equation (3.3) introduces a GARCH (1,1) model to address heteroscedasticity in the data. All three equations (3.1, 3.2, and 3.3) are estimated simultaneously using the Maximum Likelihood method.

3.2.1 Robustness Checking DCC GARCH Base Model

Unlike other multivariate GARCH models like the BEKK (Baba-Engle-Kraft-Kroner) and constant conditional correlation (CCC) models, which often face convergence issues and can produce unrealistic parameter estimates, Engle (2002) DCC model effectively captures time-varying and dynamic relationships between return series with fewer computational difficulties (Parhizgari & Cho, 2008). The DCC model directly parameterizes the conditional correlation, preserving the flexibility of a univariate GARCH model (Engle, 2002). In this study, given the large number of return series, the DCC model is applied to pairs of return series individually rather than to all return series simultaneously. This approach minimizes the risk of biased parameter estimates in high-dimensional data (Hafner & Reznikova, 2012).

The estimation of the bivariate DCC model is performed in two stages. First, a univariate GARCH (1,1) model is estimated. In the second stage, a time-varying correlation matrix is derived using the standardized residuals from the initial estimation step.

The mean equation of the DCC model is specified as:

$$r_t = \mu_t + \omega r_{t-1} + \varepsilon_t \tag{3.4}$$

where rt is the vector of price returns for gold/oil and the other asset (with return calculated as the first difference of the logarithm of closing prices); μ_t represents the conditional mean vector of r_t; and ε_t is the vector of residuals. The variance equation is specified as:

$$h_t = c + \alpha\varepsilon_{t-1}^2 + bh_{t-1} \tag{3.5}$$

where h_t denotes the conditional variance, c is the constant term, α represents the parameter capturing short-run persistence or the ARCH effect, and b represents the long-run persistence of volatility or the GARCH effect.

The DCC (1,1) equation is given by Q_t, which is a square positive-definite matrix such as:

$$Q_t = (1 - \alpha - \beta)\overline{Q} + \alpha\varepsilon_{t-1}\varepsilon_{t-1} + \beta Q_{t-1} \tag{3.6}$$

where Qt is the time-varying unconditional correlation matrix of ε_t; ε_t is a vector of standardized residuals obtained from the first-step estimation of the GARCH (1,1) process; and α and β) are parameters that represent, respectively, the effects of previous shocks and previous DCCs on the current DCC.

where Qt represents the time-varying unconditional correlation matrix of ε_t; ε_t is a vector of standardized residuals obtained from the first-step estimation of the GARCH (1,1) process; and α and β) are parameters that capture the effects of previous shocks and previous dynamic conditional correlations (DCCs) on the current DCC, respectively.

The DCC between assets i and j is calculated by:

$$\rho_{ij,t} = \frac{q_{ij,t}}{\sqrt{q_{ii,t}}\sqrt{q_{jj,t}}} \tag{3.7}$$

To ensure optimal fit for the selected DCC model, diagnostic tests will be conducted to check for autocorrelation and heteroscedasticity within the return series. However, our objective is not to delve into the specifics of DCC modeling and parameter estimates, but rather to extract pairwise dynamic conditional correlations as illustrated in Equation (3.7). These correlations will then be used to assess the hedge and safe haven properties of oil and gold (as per Equation (3.8)).

To evaluate the extent to which gold and oil serve as diversifiers, hedges, or safe havens against Middle Eastern stocks, we adopt the approach of (Ratner and Chiu 2013). Initially, dynamic conditional correlations derived from the DCC model are transformed into separate time series. These series are subsequently regressed on dummy variables D, which represent extreme movements within the lower 10th, 5th, or 1st percentiles of the return distribution.

$$\mathrm{DCC}_t = m_0 + m_1 D(r_{\mathrm{stocks},q_{10}}) + m_2 D(r_{\mathrm{stocks},q_5}) + m_3 D(r_{\mathrm{stocks},q_1}) + \nu_t \tag{3.8}$$

where DCC is the pairwise conditional correlation between Gold/Oil and middle eastern stocks under study; rstocks is the return of stock market; and vt is the error

term. Gold/Oil is a diversifier against movements in stocks if (m_0) is significantly positive. Gold/Oil is a weak hedge against movements in stocks if (m_0) is zero, or it is a strong hedge if (m_0) is negative. Gold/Oil is a weak safe haven against movements in stocks if the m_1, m_2 and m_3 coefficients are not significantly different from zero, or it is a strong safe haven if these coefficients are negative.

3.2.2 Optimal Portfolio Weights

Portfolio optimization is a critical component of modern quantitative finance, offering investors various strategies to address key investment challenges. This section examines the effectiveness of oil and gold as hedging assets for Middle Eastern stock markets. In this setting, investors aim to reduce portfolio risk without sacrificing expected returns. Kroner and Sultan (1993) introduced a hedge-ratio-based approach that has since been widely adopted in empirical research (Akhtaruzzaman et al., 2021; Chang, McAleer, & Tansuchat, 2011; Chkili, 2016). This method calculates the optimal proportion of oil or gold in a one-dollar portfolio at time "t" with the optimal weight represented in Equation (3.9).

$$W_t^{\left(\frac{i}{\text{OIL or GOLD}}\right)} = \frac{h_t^i - h_t^{\left(\frac{i}{\text{OIL or GOLD}}\right)}}{h_t^i - 2h_t^{\left(\frac{i}{\text{OIL or GOLD}}\right)} + h_t^{\text{OIL or GOLD}}} \tag{3.9}$$

where h_t^i and $h_t^{(OILorGOLD)}$ are the conditional volatilities of the selected Middle east stock market i and Oil or Gold, respectively; and $h_t^{(i/(OILorGOLD))}$ is the conditional covariance between Oil or Gold and the return of Stocks i at time t. All the variances and covariances are extracted from the DCC model estimates. The weight of stocks i in the one-dollar portfolio of Oil or Gold at time t equals $(1W_t^{(i/(OILorGOLD)))}$.

Chapter 4

Result and Analysis

4.1 Descriptive Statistics

Table 4.1 presents descriptive statistics covering three distinct time periods: the overall period from 2000 to 2023, the pre-COVID-19 period from 2000 to 10 March 2020, and the COVID-19 period from 11 March 2020 to 5 May 2023. The table includes country names, mean returns, standard deviations, maximum and minimum returns, skewness, and kurtosis for each market. Additionally, it provides a breakdown of these statistics for each of the three periods, allowing for an analysis of results across the overall timeframe, pre-COVID-19, and during COVID-19.

Analysis for overall period, for brent oil the mean return (0.0000) is neutral with extreme volatility (standard deviation 0.0235), extreme values maximum (0.1908) and minimum (-0.3749), a negative skewness (-1.5972) and kurtosis (33.5648) is very high and its indication of frequent extreme movements.

On the other side gold future shows a little positive mean return (0.0002) with less volatility (standard deviation 0.0103), and a negative skewness (-1.0737) and high kurtosis (18.6523). This indicates that both commodities exhibit risks, Brent oil is high volatile and inclined to extreme variations then gold futures. Most of the market's returns are slight positive indicates that on average market gains over period of time. The standard deviation shows variations in these countries Cyprus, Egypt, Israel and KSA indicating higher volatility resultingly returns in

these markets are more spread out from the mean. Bahrain, Egypt, Israel, and KSA having negative skewness show small losses than gains.

Analysis for pre-COVID-19 period, slightly negative mean return (-0.0003) for brent oil with moderate volatility (standard deviation 0.0211), negative skewness (-2.2533) and higher kurtosis (47.80160 indicates higher risk and more extreme values during this period.

On the other side marginally positive return (0.0001) for gold futures with stable volatility (standard deviation 0.0101), negative skewness (-1.5294) and higher kurtosis (23.3954). The results indicate the stable but riskier gold market compared to oil during pre-COVID-19 period. Bahrain and Cyprus show consistent returns when are talking about country specific results.

Analysis for COVID-19 period, significant changes notice in the performance of oil and gold. A positive mean return (0.0009), increased volatility (standard deviation 0.0304) with less negative skewness (-0.8865) and kurtosis (17.4574) of brent oil indicates that there are few extreme movements.

On the other hand Gold Future shows positive mean return (0.0003) with slight higher volatility (standard deviation 0.0113) with negative skewness (-0.0984) and kurtosis (8.3217) indicates normalized distribution.

During pandemic the index of Israel and UAE also showed improved performance. Positive mean return for both countries with high volatility reflecting more consistent but higher risk performance during COVID-19.

The graphical representations below illustrate the volatility in returns for gold, oil, and each Middle Eastern stock market. Figures 4.1(A-F) and 4.2(A-F) show the trends in gold and oil prices and returns, respectively, from 2000 to 2023, with exceptions for Bahrain (2010-2023) and Kuwait (2012-2023).

The data is divided into three distinct periods: the overall period, encompassing all data from the beginning until 2023; the pre-COVID-19 period, covering the start of the dataset up to March 11, 2020; and the COVID-19 period, which spans from March 11, 2020, to May 5, 2023, with COVID-19 dates aligned to the World Health Organization (WHO) timeline.

Table 4.1: Descriptive Statistics

		Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
Brent Oil							
	Overall	0.0000	0.1908	-0.3749	0.0235	-1.5972	33.5648
	Pre COVID-19	-0.0003	0.1337	-0.3749	0.0211	-2.2533	47.8016
	Covid	0.0009	0.1908	-0.2798	0.0304	-0.8865	17.4574
Gold Future							
	Overall	0.0002	0.0580	-0.1395	0.0103	-1.0737	18.6523
	Pre COVID-19	0.0001	0.0476	-0.1395	0.0101	-1.5294	23.3954
	Covid	0.0003	0.0580	-0.0675	0.0113	-0.0984	8.3217
Bahrain							
	Overall	0.0001	0.0342	-0.0362	0.0048	-0.4489	9.9096
	Pre COVID-19	0.0000	0.0275	-0.0347	0.0047	-0.5097	9.0941
	Covid	0.0003	0.0342	-0.0362	0.0055	-0.3482	10.1143
Cyprus							
	Overall	0.0005	0.0730	-0.0844	0.0108	-0.2897	11.6659
	Pre COVID-19	0.0005	0.0730	-0.0753	0.0098	-0.0493	12.0708
	Covid	0.0007	0.0659	-0.0844	0.0163	-0.7437	7.0529
Egypt							
	Overall	0.0005	0.0868	-0.1112	0.0156	-0.4101	7.2095
	Pre COVID-19	0.0005	0.0868	-0.1112	0.0160	-0.4186	6.9691
	Covid	0.0005	0.0575	-0.0981	0.0133	-0.3409	9.4418
Israel							
	Overall	0.0002	0.0829	-0.0930	0.0134	-0.4675	8.9148
	Pre COVID-19	0.0002	0.0829	-0.0915	0.0131	-0.4769	9.1617
	Covid	0.0006	0.0828	-0.0930	0.0145	-0.2509	7.6316
Jordon							
	Overall	0.0002	0.0470	-0.0475	0.0092	-0.0790	7.2321
	Pre COVID-19	0.0002	0.0470	-0.0475	0.0095	-0.0854	7.1112
	Covid	0.0004	0.0323	-0.0467	0.0080	-0.0184	6.7042
KSA							

Table 4.1 continued from previous page

		Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
	Overall	0.0003	0.0939	-0.1033	0.0134	-0.9516	14.2621
	Pre COVID-19	0.0002	0.0939	-0.1033	0.0140	-0.9086	13.7360
	Covid	0.0007	0.0348	-0.0770	0.0099	-1.3227	10.7971
Kuwait							
	Overall	0.0001	0.0475	-0.0961	0.0081	-0.9414	14.3290
	Pre COVID-19	0.0000	0.0475	-0.0961	0.0083	-1.0345	16.2137
	Covid	0.0005	0.0409	-0.0563	0.0081	-0.8168	9.8564
Lebanon							
	Overall	0.0001	0.0851	-0.1069	0.0112	-0.1617	17.9139
	Pre COVID-19	0.0000	0.0475	-0.0961	0.0083	-1.0345	16.2137
	Covid	0.0005	0.0409	-0.0563	0.0081	-0.8168	9.8564
Oman							
	Overall	0.0001	0.0804	-0.0870	0.0084	-1.0198	24.8925
	Pre COVID-19	0.0001	0.0804	-0.0870	0.0089	-1.0268	23.6782
	Covid	0.0003	0.0276	-0.0290	0.0055	-0.1204	6.8474
Qatar							
	Overall	0.0004	0.0942	-0.1021	0.0119	-0.4453	13.1684
	Pre COVID-19	0.0004	0.0942	-0.1021	0.0126	-0.4597	12.5484
	Covid	0.0002	0.0341	-0.0455	0.0079	-0.1574	7.4824
Turkey							
	Overall	0.0006	0.1776	-0.1998	0.0204	-0.1806	10.5760
	Pre COVID-19	0.0003	0.1776	-0.1998	0.0206	-0.0812	10.9654
	Covid	0.0019	0.0942	-0.1031	0.0184	-1.0367	9.1509
UAE							
	Overall	0.0004	0.0808	-0.0868	0.0108	-0.1768	13.4781
	Pre COVID-19	0.0003	0.0763	-0.0868	0.0108	-0.1833	12.1962
	Covid	0.0010	0.0808	-0.0815	0.0115	-0.1736	18.1047

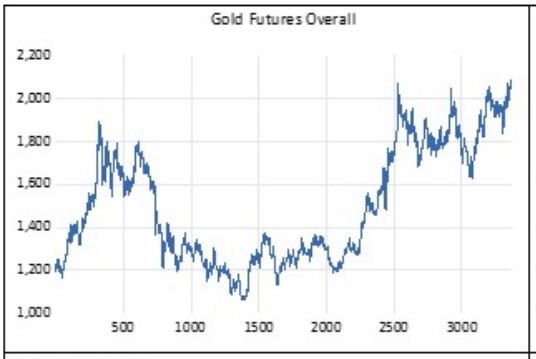


Figure 4.1A

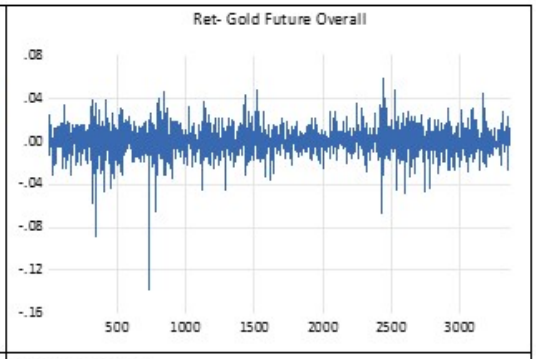


Figure 4.1B

Figure 4.1C

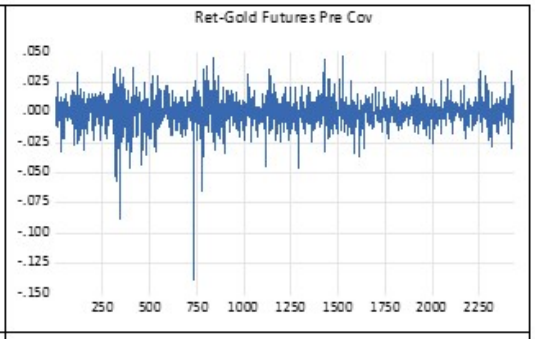


Figure 4.1D

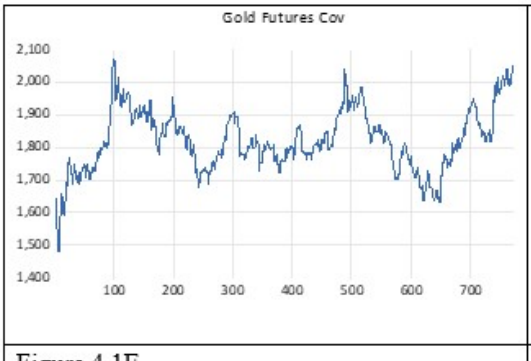


Figure 4.1E

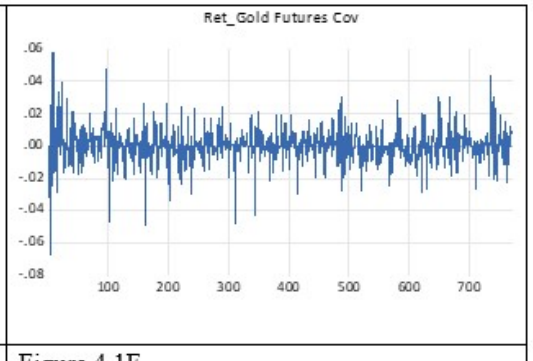


Figure 4.1F

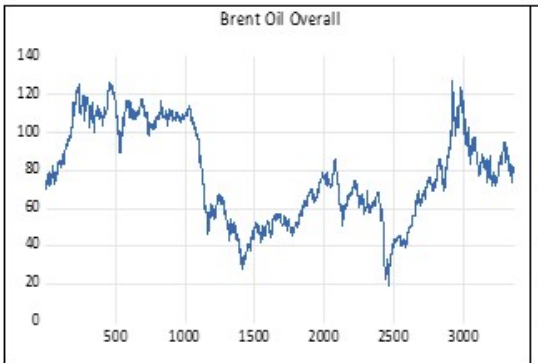


Figure 4.2A

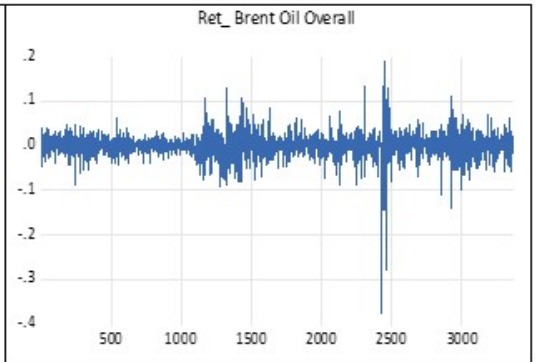
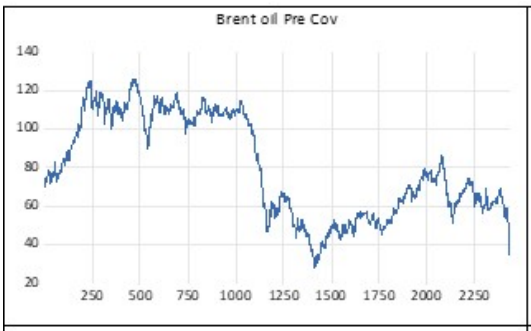


Figure 4.2B



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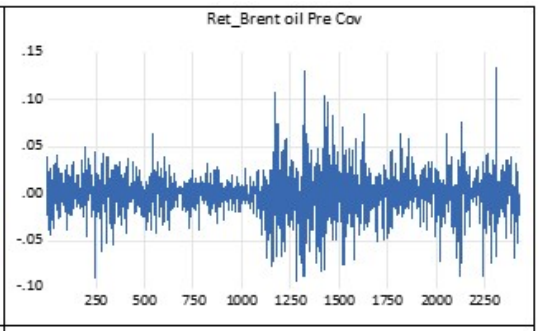

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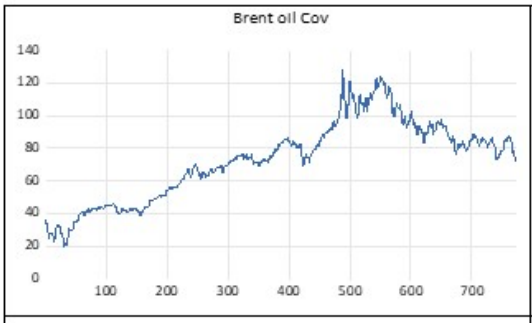

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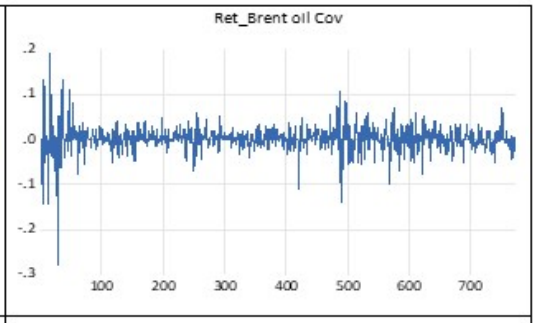


Figure 4.2F

For overall period in figure 4.1A and 4.2A gold appears more stable and shows an upward trajectory, brent oil is more volatile. For Pre COVID-19 period in figure 4.1C and 4.2C gold demonstrates a resilience and upward trend, particularly in the later half, brent oil, however, follows a more volatile path with a general downward trend. For the COVID-19 period in figure 4.1E and 4.2E gold demonstrates a stable and upward trend, brent oil exhibits a more volatile trend with a strong mid-pandemic recovery followed by a decline.

4.2 Gold and Oil as a Hedge, Diversifier or Safe Haven

Gold prices showed a discernible degree of consistency during the research period, particularly in comparison to the more erratic oil prices, which saw notable increases and decreases. Even during the COVID-19 epidemic, which was a period of significant economic uncertainty, the stability of gold prices indicates a degree of resilience in the face of outside pressure.

On the other hand, oil prices fluctuated significantly, which was indicative of shifting supply and demand dynamics made worse by COVID-19's unpredictability.

Global markets experienced a new degree of unpredictability as a result of the epidemic, which caused sudden adjustments to demand, production levels, and regulatory reactions.

These COVID-19 related disruptions were most noticeable in the oil markets, as the economic impacts of the pandemic caused a significant response in oil prices. The key feature of equity returns of the Middle Eastern Stocks is that these are dynamic in nature and time varying.

The variations in the Middle Eastern countries are static over the sample period as expected i.e. there are phases of significantly high and low volatility, as demonstrated in the graphical form.

The stock markets of Middle East's including Bahrain (4.3), Cyprus (4.4), Egypt (4.5), Israel (4.6), Jordon (4.7), Kingdom of Saudi Araba (4.8), Kuwait (4.9), Lebanon (4.10), Oman (4.11), Qatar (4.12), Turkey (4.13), United Arab Emirates (4.14).

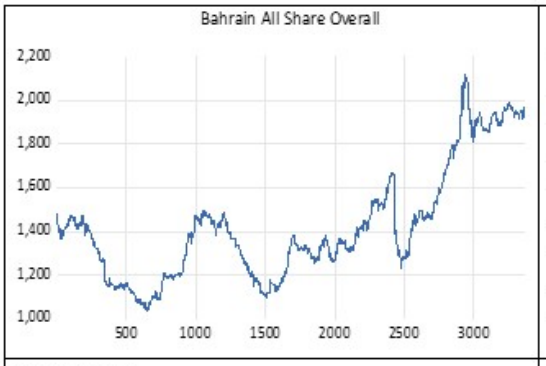


Figure 4.3A

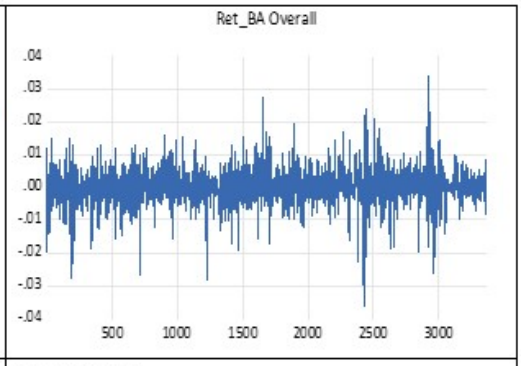


Figure 4.3B

Figure 4.3C

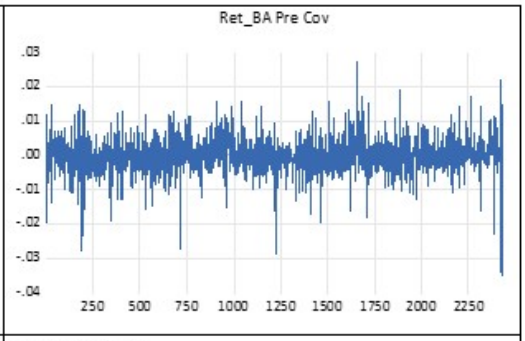


Figure 4.3D

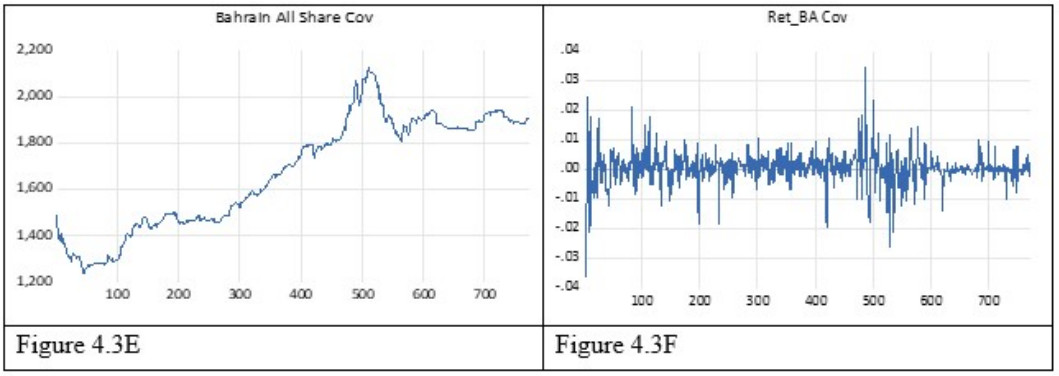


Figure 4.3E | Figure 4.3F

The stock markets of Middle East's including Bahrain (4.3A overall, 4.3C pre COVID-19 and 4.3E during COVID-19), Throughout the pre-COVID-19, during COVID-19, and overall periods, the Bahrain All Share Index exhibits a cyclical but rising trend.

After initially declining, the index gradually recovers with some volatility. It reaches a notable peak and stabilizes at a greater level during COVID. With growth periods punctuated by corrections, the index exhibits resilience overall, reaching more stability at the conclusion of the period.

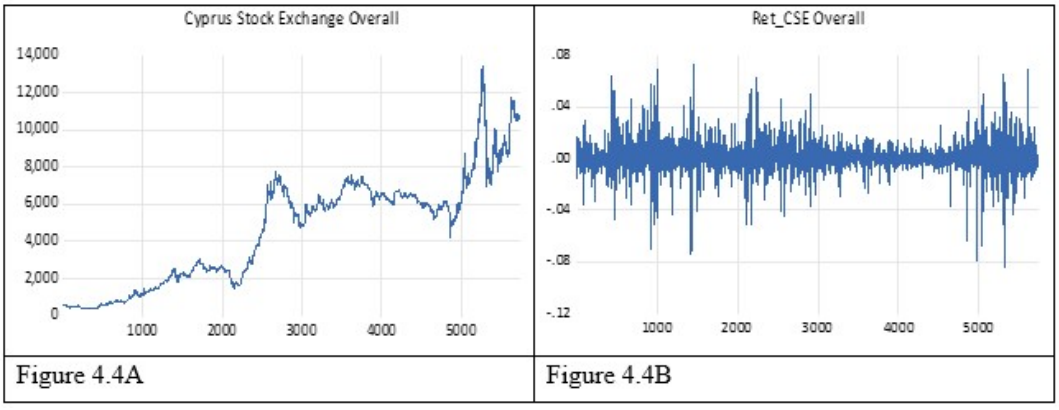


Figure 4.4A | Figure 4.4B

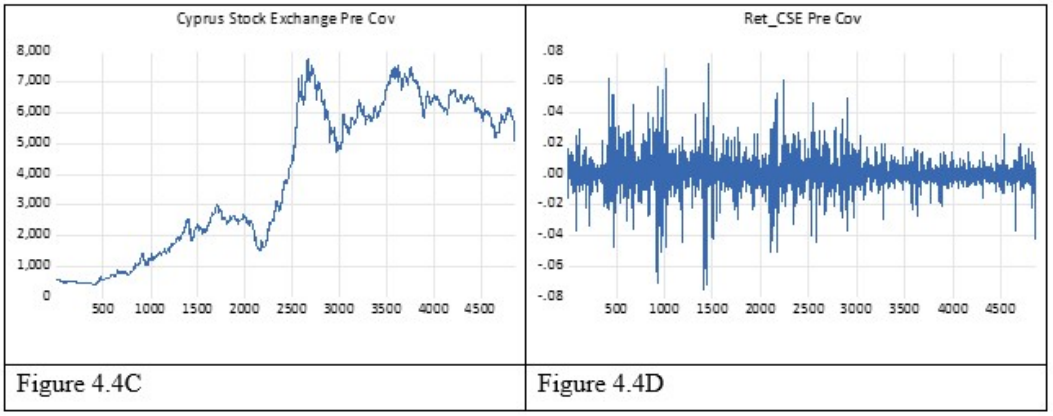


Figure 4.4C | Figure 4.4D

Figure 4.4E

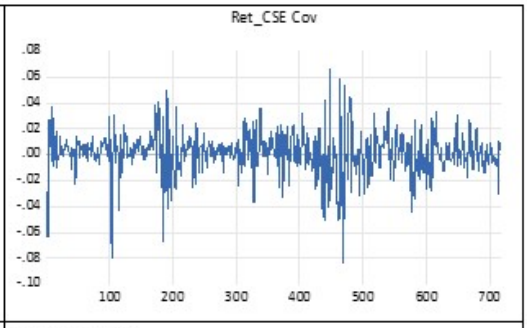


Figure 4.4F

Cyprus (4.4A overall, 4.4C pre COVID-19 and 4.4E during COVID-19), the Cyprus Stock Exchange exhibits a robust increasing trend with cycles of expansion, peaks, and corrections over the overall period, pre-COVID-19 and COVID-19 eras. The overall trend of the Cyprus Stock Exchange shows a long-term upward trajectory, growth was stable prior to the COVID-19 era, but there was significant volatility throughout that time, with steep increases and decreases. In spite of external shocks and market adjustments, the market eventually stabilizes at a higher level at the conclusion of the COVID-19 period, demonstrating resilience and an overall positive growth trajectory.

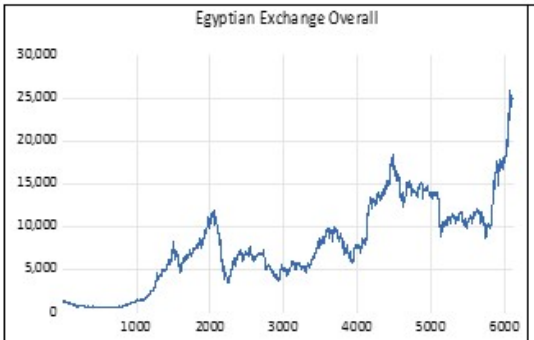


Figure 4.5A

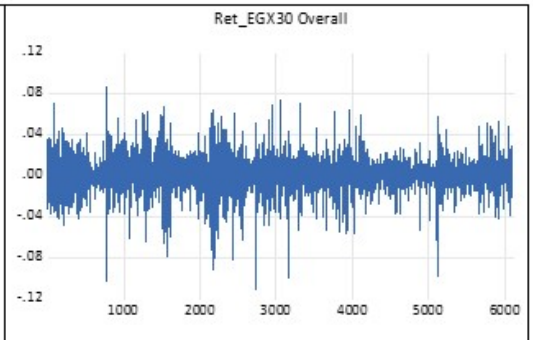


Figure 4.5B

Figure 4.5C

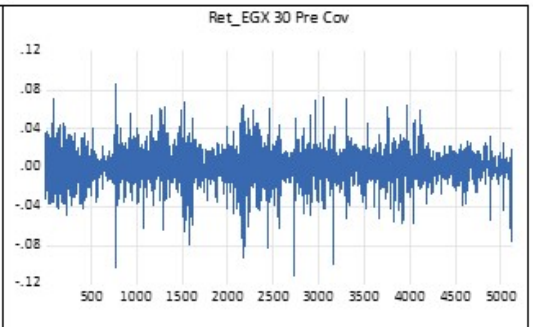
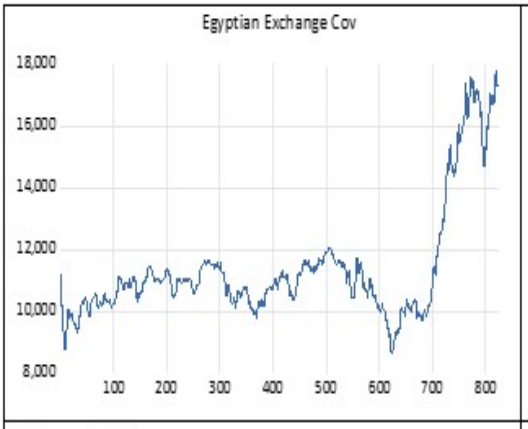


Figure 4.5D



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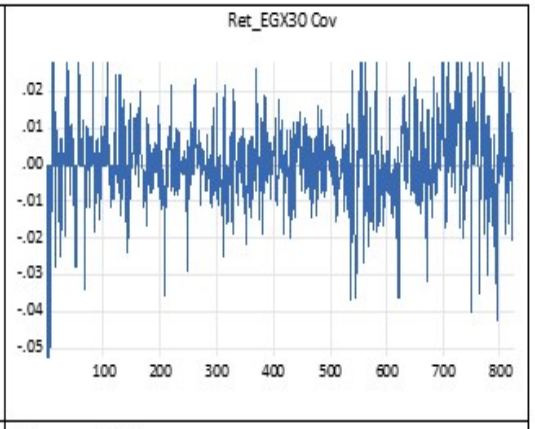


Figure 4.5F

Egypt (4.5A overall, 4.5C pre COVID-19 and 4.5E during COVID-19), throughout the Overall, Pre-COVID-19, and during COVID-19 periods, the Egyptian Exchange shows steady expansion, with distinct features in each stage.

The exchange exhibits a robust increasing trajectory with sporadic corrections throughout the whole duration, underscoring consistent long-term growth. The market saw consistent rises and stable, mild declines during the pre-COVID-19 era, indicating a favorable and growth-oriented climate.

Following a period of early stability during the COVID-19 period, the market experiences a dramatic upswing, exhibiting a robust recovery and flexibility in reaction to economic changes brought on by the pandemic, before settling at a higher level.

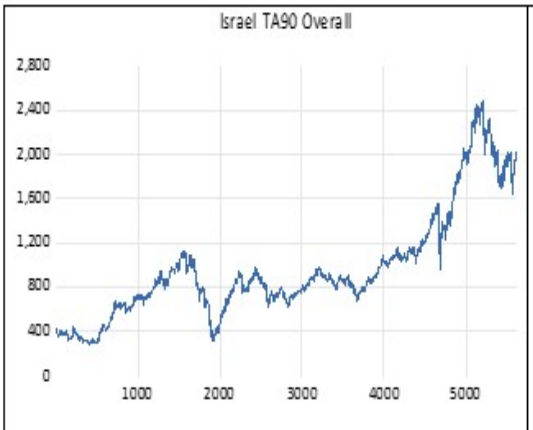


Figure 4.6A

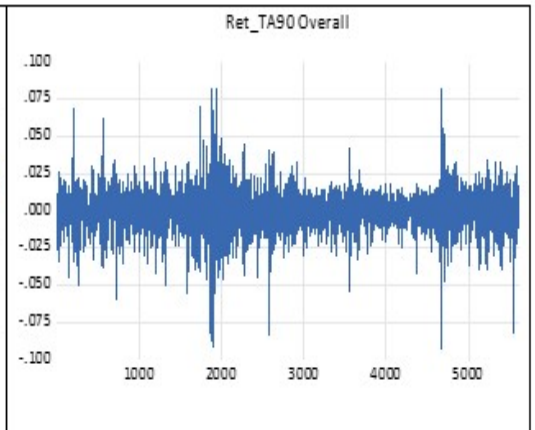
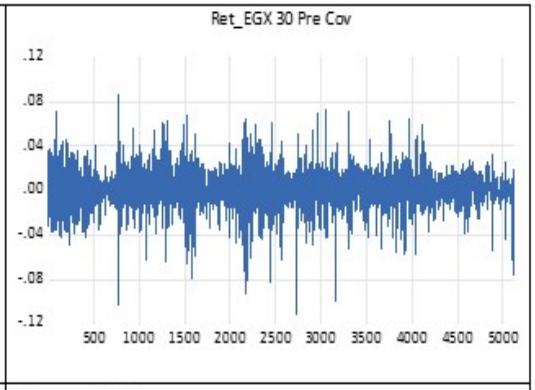


Figure 4.6B

Figure 4.5C



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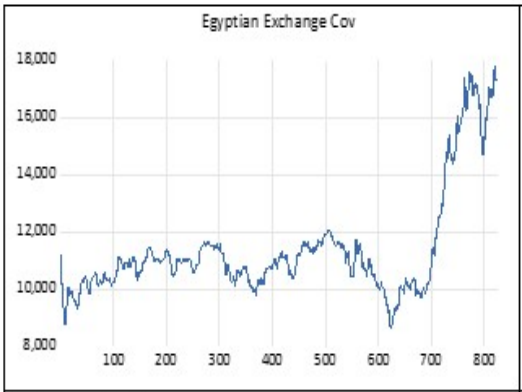

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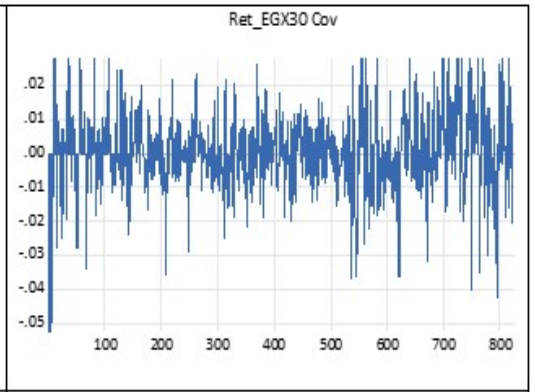

Figure 4.5F

Israel (4.6A overall, 4.6C pre COVID-19 and 4.6E during COVID-19), Over its periods, the Israel's TA90 index is in three different tendencies.

Even with some corrections, the overall trend is a strong upward one with sporadic dips, indicating a general rising trajectory throughout time. This pattern demonstrates the market's tenacity and long-term upward trajectory.

A steady upward climb with little volatility characterizes the trend in the pre-COVID-19 era, stable conditions are indicated by the index peaking immediately prior to the COVID-19 timeline.

The tendency changes to greater volatility during the COVID-19 period, climbing substantially at first before falling. In contrast to the prior consistent increasing trends, this erratic pattern demonstrates the market's increased susceptibility to the epidemic.

Figure 4.6A

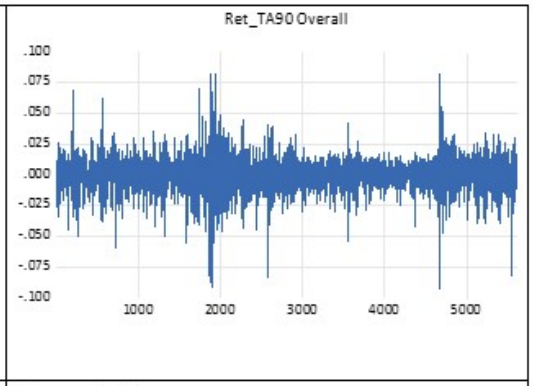

Figure 4.6B

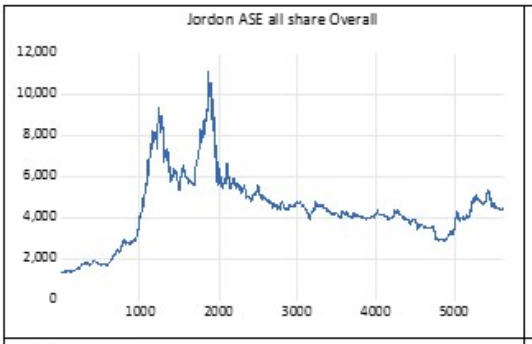

Figure 4.7A

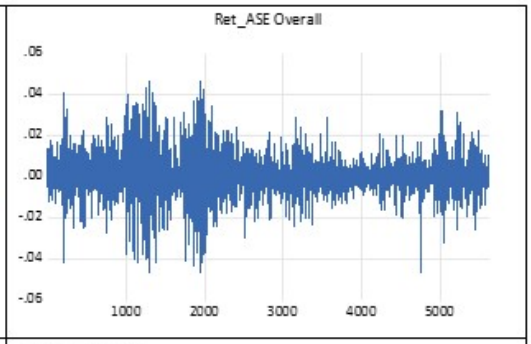

Figure 4.7B

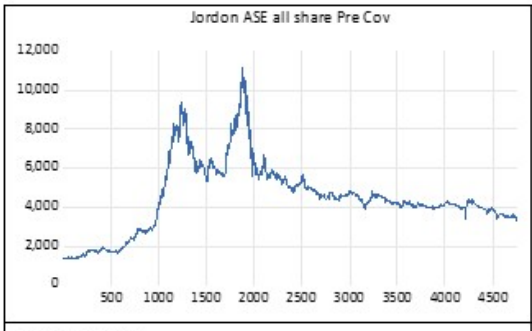

Figure 4.7C

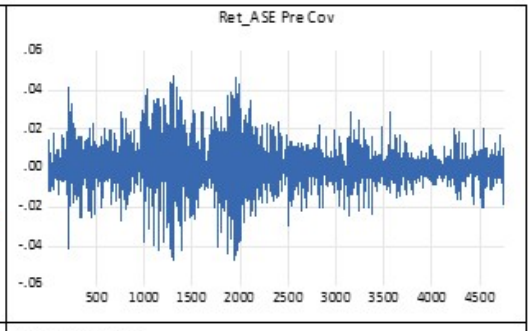

Figure 4.7D

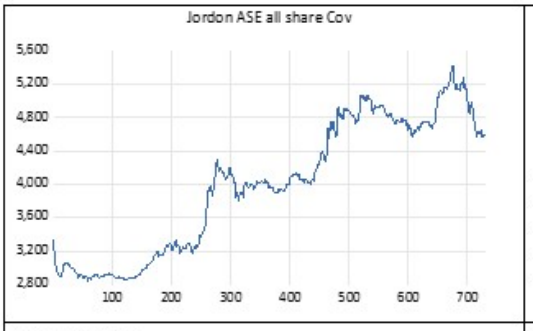

Figure 4.7E

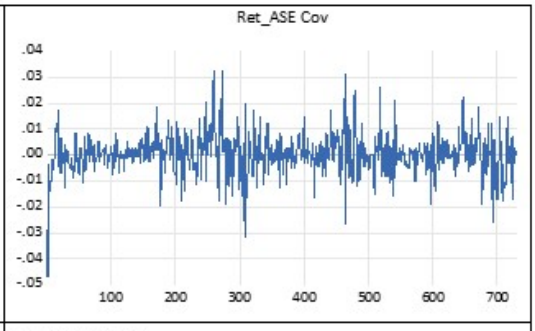

Figure 4.7F

Jordon (4.7A overall, 4.7C pre COVID-19 and 4.7E during COVID-19), three different trend stages for Jordon's ASE All Share index. All things considered, the index rose quickly before experiencing severe correction and long-term stabilization at a lower level. Prior to COVID-19, the index maintained its low-level, steady trend with little volatility, indicating a quiet market following previous corrections. Though it remained erratic, the index recovered and showed upward movement during the COVID-19 period, marking a shift in the trend towards growth. Due to economic stimulus and rekindled market interest, this time frame represents a recovery phase. When taken as a whole, these patterns reflect a market that is sensitive to outside influences and exhibits cyclical patterns of expansion, correction, and cautious rebound.

Figure 4.8A

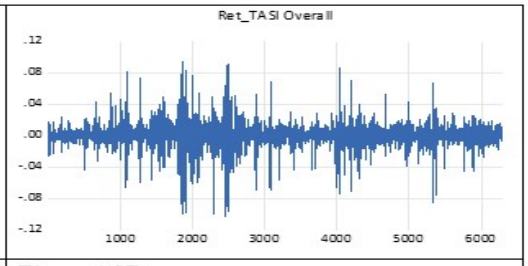

Figure 4.8B

Figure 4.8C

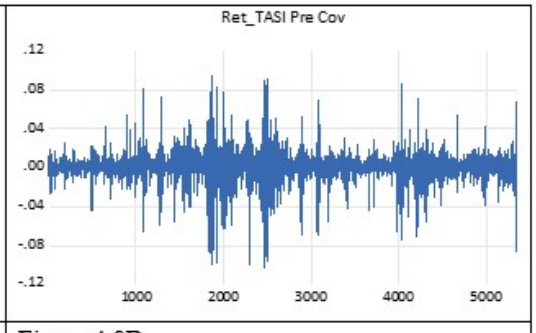

Figure 4.8D

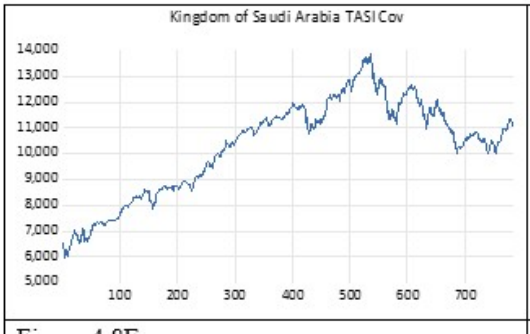

Figure 4.8E

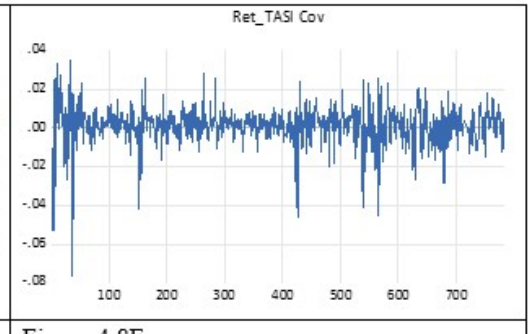

Figure 4.8F

Kingdom of Saudi Arabia (4.8A overall, 4.8C pre COVID-19 and 4.8E during COVID-19), with fluctuating degrees of volatility throughout various time periods, the Kingdom of Saudi Arabia's TASI index clearly exhibits a long-term increasing trend. For overall period, the index shows a robust increasing trend, with more volatility during periods of significant expansion. Market stability is seen in the index's steady rising trajectory and moderate swings prior to COVID-19. The TASI exhibits resurgent growth and elevated volatility during the COVID-19 period, suggesting a dynamic market reaction to economic stimulus and pandemic worries. When taken as a whole, these patterns demonstrate TASI's adaptability, consistent growth, and resilience to shifting market conditions.

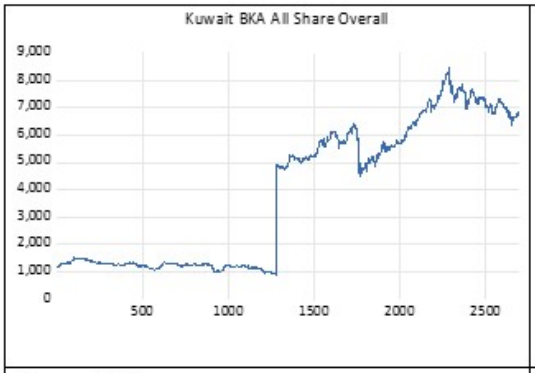

Figure 4.9A

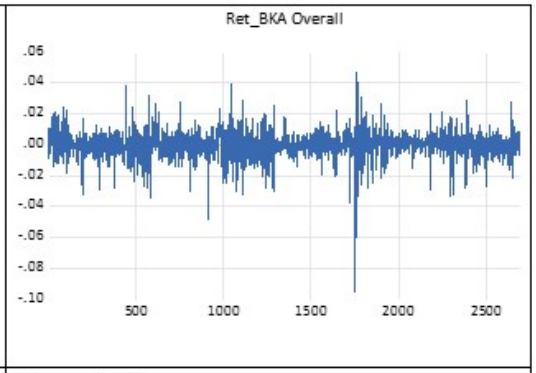

Figure 4.9B

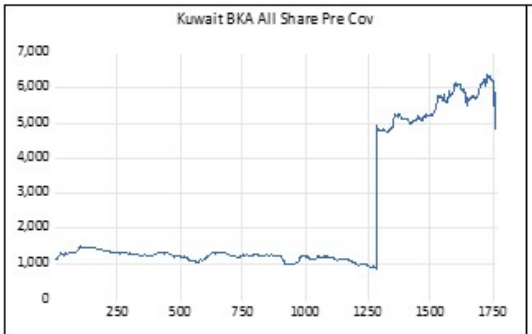

Figure 4.9C

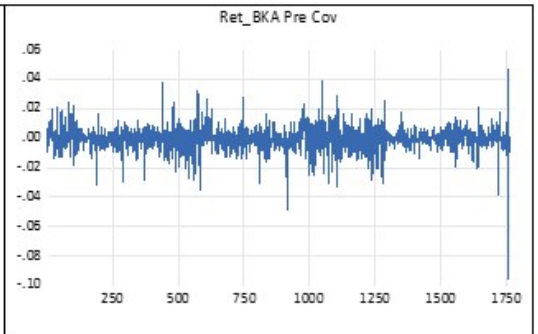

Figure 4.9D

Figure 4.9E

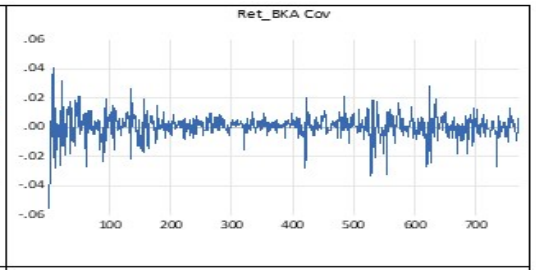

Figure 4.9F

Kuwait (4.9A overall, 4.9C pre COVID-19 and 4.9E during COVID-19), Three different trends in the Kuwait BKA All Share index during the overall period pre COVID-19 period and COVID-19 period. All things considered; the index has a robust upward trend with a discernible jump that raises stability before experiencing slow oscillations. Prior to COVID-19, the trend was stable and characterized by a notable step increase. Following that, it continued to grow and stabilize moderately, demonstrating steady market confidence. The market's attempt at growth in the face of pandemic-related uncertainty is shown in the index's strong ascent during COVID-19, which peaks before encountering some oscillations. The BKA All Share index as a whole exhibits a robust and flexible development pattern, with notable fluctuations that reflect how responsive it is to both domestic and international economic events.

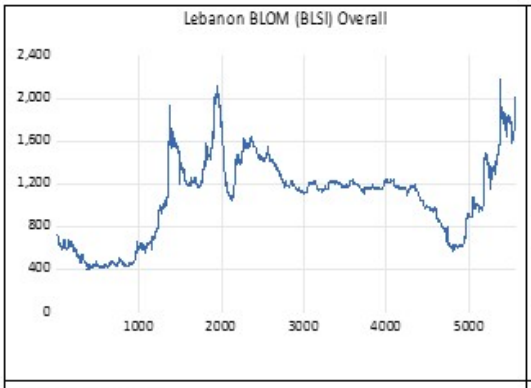

Figure 4.10A

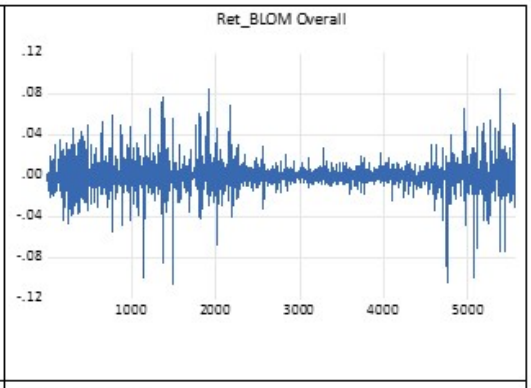

Figure 4.10B

Figure 4.10C

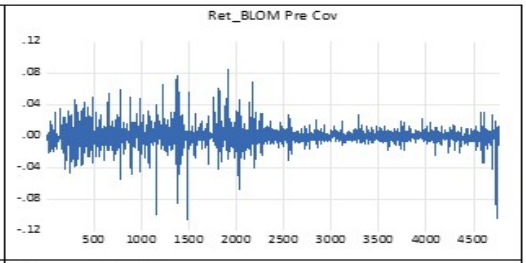

Figure 4.10D

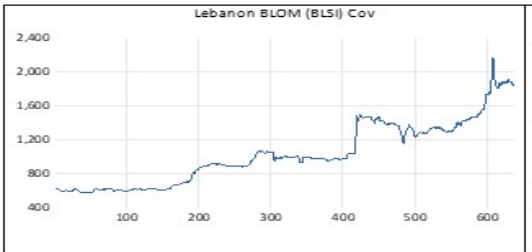

Figure 4.10E

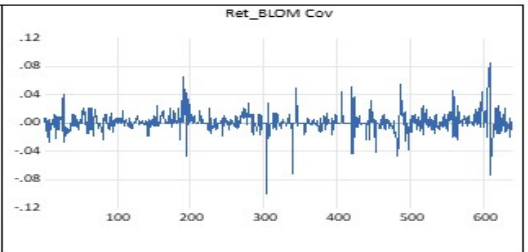

Figure 4.10F

Lebanon (4.10A overall, 4.10C pre COVID-19 and 4.10E during COVID-19), the Lebanon's BSE index demonstrates distinct trends and volatility/fluctuations across the overall period, pre COVID-19 period, and COVID-19 period. Overall period, there is significant volatility with sharp peaks early on, followed by a long period of relative stability at lower levels. Towards the end, there is a sudden upward trend with increased volatility, indicating renewed market activity. In the pre-COVID-19 period, there is a rise with several prominent peaks, followed by a downward trend and eventual stabilization with moderate fluctuations, reflecting a period of diminishing market strength but controlled volatility. During the COVID-19 period, the index trends steadily upward, with a sharp increase toward the end, this period is marked by higher volatility near the peak, highlighting market uncertainty amid recovery efforts.

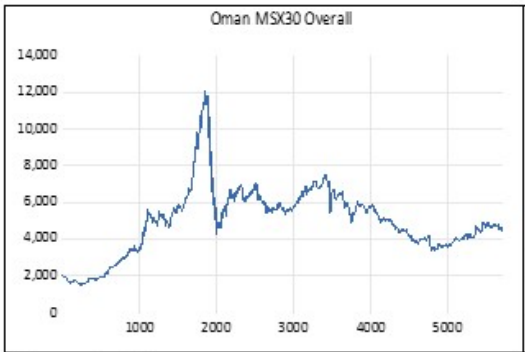

Figure 4.11A

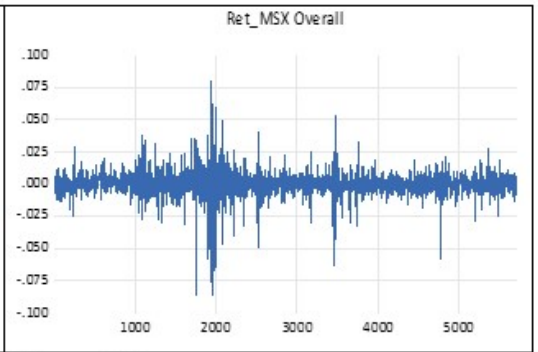

Figure 4.11B

Figure 4.11C

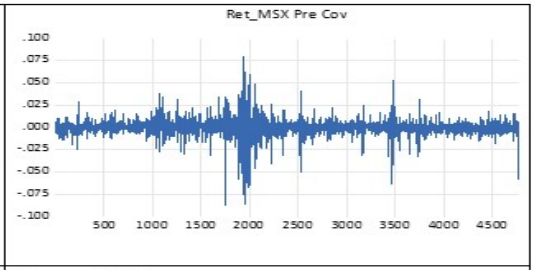

Figure 4.11D

Figure 4.11E

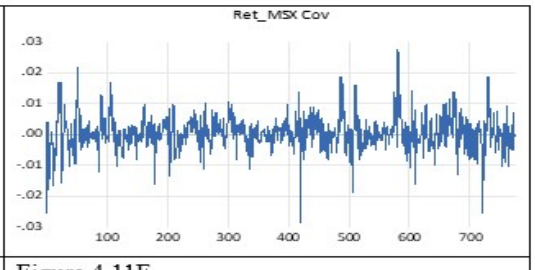

Figure 4.11F

Oman (4.11A overall, 4.11C pre COVID-19 and 4.11E during COVID-19), The Oman MSX30 index displays diverse trends across various periods. The index in the overall period peaked, then saw a steep decrease before stabilizing at a lower level over time, suggesting a negative tendency following its high point. The index did not reach its prior peak in the per COVID-19 era, indicating persistent market difficulties, and instead continued to decline with intermittent rebounds. However, the index showed a consistent upward trend during the COVID-9 period, suggesting a recovery or favorable adjustment in response to the pandemic, maybe as a result of market resilience or economic interventions.

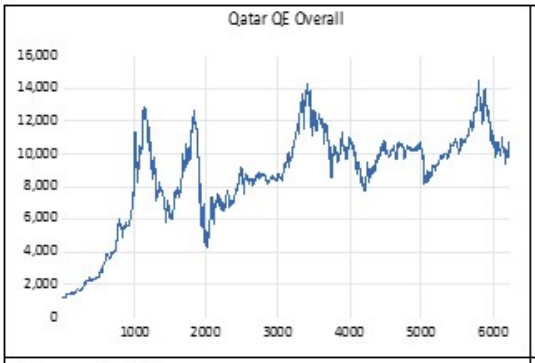

Figure 4.12A

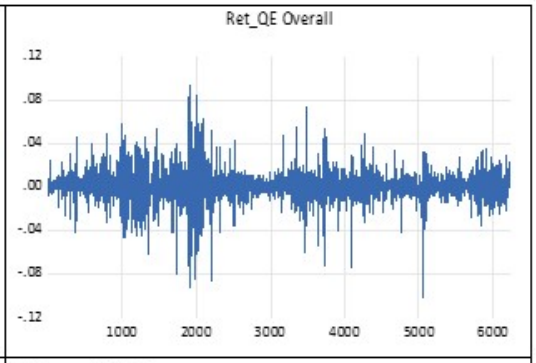

Figure 4.12B

Figure 4.12C

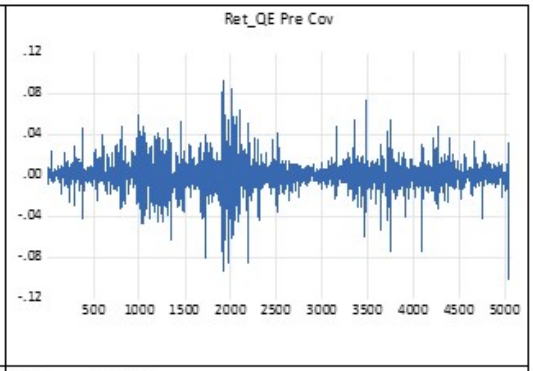

Figure 4.12D

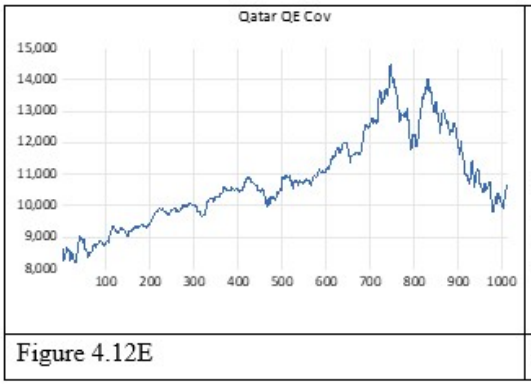

Figure 4.12E

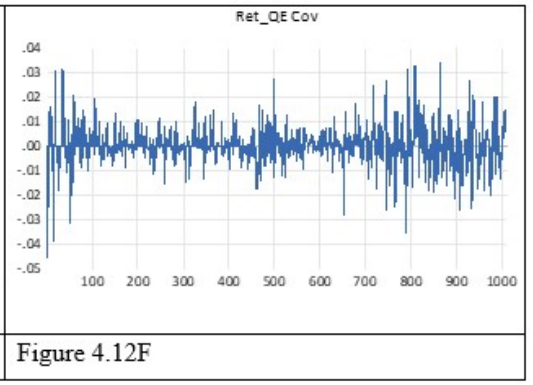

Figure 4.12F

Qatar (4.12A overall, 4.12C pre COVID-19 and 4.12E during COVID-19), The Qatar QE index exhibits a pattern of cyclical growth over the whole/overall period, with several peaks followed by corrections, signifying periods of expansion and contraction. This long-term pattern points to a market that is both resilient and sensitive to different market pressures, frequently adjusting downward even though it has occasionally seen significant growth. This cyclical pattern is still present in the pre COVID-19 era, with many oscillations, as the index oscillates frequently within a steady range without a discernible directional trend. The index first rises throughout the COVID-19 then it moves toward downward in the last portion of pandemic.

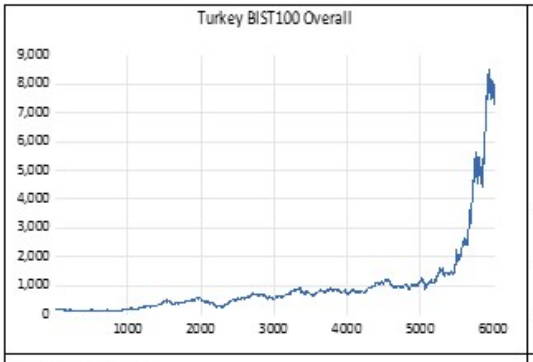

Figure 4.13A

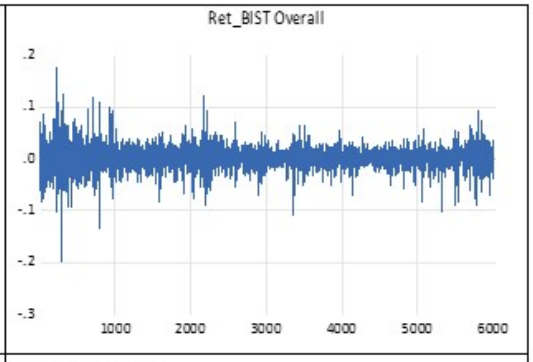

Figure 4.13B

Figure 4.13C

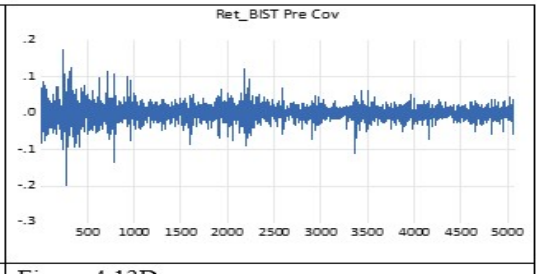

Figure 4.13D

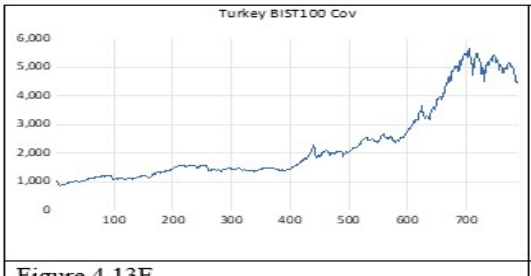

Figure 4.13E

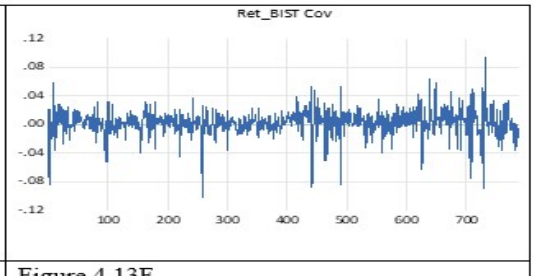

Figure 4.13F

Turkey (4.13A overall, 4.13C pre COVID-19 and 4.13E during COVID-19), a long-term pattern of consistent growth followed by a sudden, exponential rise is evident

in the Turkey BIST100 index during overall period. The index shows consistent growth with sporadic corrections during the pre COVID-19 era, with a slow upward tendency and frequent fluctuations. But during the COVID-19 period, the trend changes to a faster rise that peaks sharply, indicating increased market activity during the pandemic. Overall, the BIST100 trend shows vulnerability to outside economic influences as it moves from moderate, consistent rise to an accelerating surge.

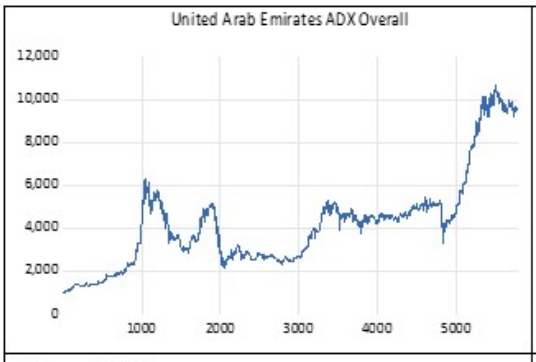

Figure 4.14A

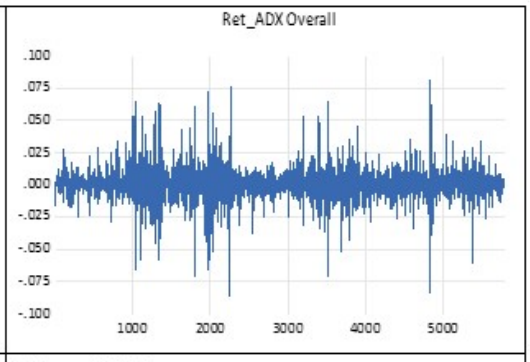

Figure 4.14B

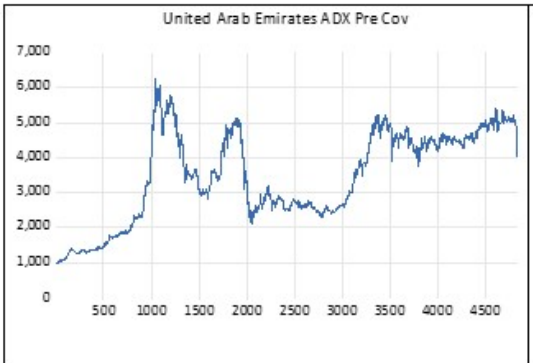

Figure 4.14C

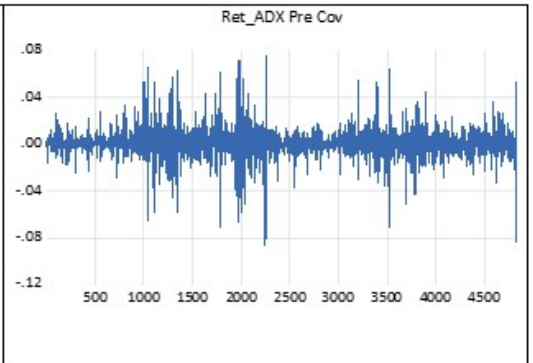

Figure 4.14D

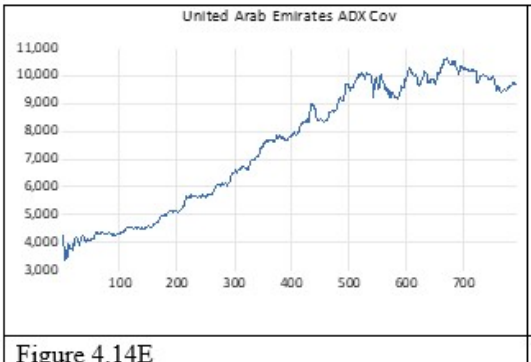

Figure 4.14E

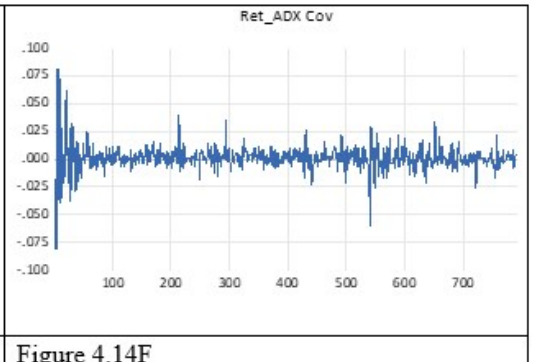

Figure 4.14F

United Arab Emirates (4.14A overall, 4.14C pre COVID-19 and 4.14E during COVID-19), the ADX index for the United Arab Emirates shows a range of trends during overall period. A robust recovery and growth phase is indicated by the index's general trend, which begins with a period of expansion and continues through cycles of peaks and corrections before rising sharply towards the end. The index's trajectory in the pre COVID-19 era suggests consistent but constrained growth, with early strong gains followed by a protracted period of stability with mild swings. The index shows a strong upward trend throughout the COVID-19 era, showing steady increase with only slight corrections, culminating in a high point at the end of the term.

4.3 Hedge, Diversifier and Safe Haven Properties of Gold using Baur Model

Tables 4.2 (overall period), 4.4 (pre-COVID-19 period), and 4.6 (COVID-19 period) present the estimates for gold and Middle Eastern equity markets using the Baur Model. These tables provide the estimates for c1 (stock market returns) and the values for extreme market conditions: c2 for the 10% quantile, c3 for the 5% quantile, and c4 for the 1% quantile. Additionally, the tables include the variance equation estimates, allowing for a comprehensive analysis of the model's performance across different periods.

In Bahrain, gold serves as a weak safe haven across all percentiles (1st, 5th, and 10th), (0.0448, -0.0767, 0.0327) consistently maintaining this property on average returns (0.0141), though it functions only as a weak hedge (0.0002) on average. In Cyprus, gold is also a weak safe haven across all percentiles, sustaining this role on average returns, but it does not act as a hedge (0.0004***). For Egypt, gold acts as a strong safe haven at the 10th percentile (-0.0504*) and a weak safe haven at the 5th and 1st percentiles, with this property holding on average returns; however, it does not function as a hedge. In Israel, gold consistently serves as a weak safe haven across all percentiles, maintaining this status on average returns, but does not act as a hedge.

TABLE 4.2: Hedge, Diversifier and Safe Haven Properties of Gold During Overall Period Mean Equation Baur Model

Country	**Constant**	**RM**	**Q10**	**Q5**	**Q1**
Bahrain	0.0002	0.0141	0.0327	-0.0767	0.0448
	(0.0001)	(0.0340)	(0.1018)	(0.1079)	(0.0743)
Cyprus	0.0004***	0.0185	-0.0144	-0.0020	-0.0268
	(0.0001)	(0.0145)	(0.0470)	(0.0508)	(0.0369)
Egypt	0.0002*	0.0103	-0.0504*	0.0334	-0.0218
	(0.0001)	(0.0114)	(0.0279)	(0.0276)	(0.0184)
Israel	0.0003***	0.0023	-0.0149	0.0343	-0.0060
	(0.0001)	(0.0114)	(0.0278)	(0.0319)	(0.0350)
Jordon	0.0003***	0.0024	-0.0060	-0.0033	-0.0184
	(0.0001)	(0.0149)	(0.0431)	(0.0482)	(0.0462)
KSA	0.0002	0.0146	-0.0088	-0.0282	0.0101
	(0.0001)	(0.0148)	(0.0471)	(0.0463)	(0.0284)
Kuwait	0.0000	0.0301	-0.0458	-0.0343	0.0856
	(0.0001)	(0.0218)	(0.0609)	(0.0645)	(0.0553)
Lebanon	0.0004***	0.0130	-0.0198	-0.0044	-0.0253
	(0.0001)	(0.0145)	(0.0479)	(0.0525)	(0.0379)
Oman	0.0002*	0.0735***	-0.1365*	0.1349	-0.0284
	(0.0001)	(0.0253)	(0.0802)	(0.0852)	(0.0520)
Qatar	0.0002**	0.0226**	-0.0361	0.0077	-0.0141
	(0.0001)	(0.0093)	(0.0266)	(0.0294)	(0.0246)
Turkey	0.0004***	0.0144**	0.0280	-0.0412*	-0.0032
	(0.0001)	(0.0067)	(0.0204)	(0.0227)	(0.0188)
UAE	0.0003**	0.0219	-0.0184	-0.0162	0.0835**
	(0.0001)	(0.0169)	(0.0586)	(0.0603)	(0.0346)

Note: ***, 1% significance level, **, 5% significance level, *, 10% significance level.

Table 4.2 presents the results of the mean equation, highlighting gold's role as a weak safe haven across different Middle Eastern markets, with occasional nonlinear relationships affecting its capabilities.

In Jordan and Saudi Arabia, gold behaves as a weak safe haven at the 1st, 5th, and 10th percentiles, maintaining this role on average returns. It acts as a weak hedge on average for Saudi Arabia but not for Jordan. In Kuwait and Lebanon, gold operates as a weak safe haven across all percentiles and maintains this role on average returns but does not act as a hedge for Lebanon and weak hedge for Kuwait market. In Oman, gold is a strong safe haven at the 10th percentile and a weak safe haven at the 5th and 1st percentiles, nonlinear relationship exist on average returns (0.0735***), though it does not function as a hedge.

For Qatar, gold acts as a weak safe haven across all percentiles, though a nonlinear relationship on average returns and not acting as a hedge. In Turkey, gold is a weak safe haven at the 10th and 1st percentile and strengthens to a strong safe haven at the 5th percentile, while a nonlinear relationship on average returns and does not acts as a hedge. In the United Arab Emirates, gold serves as a weak safe haven at the 10th and 5th percentiles, consistently holding this role on average returns, though a nonlinear relationship at the 1st percentile under extreme conditions and does acts as a hedge on average.

Table 4.3: Variance Equation Baur Model

Country	**Constant**	**ARCH**	**GARCH**
Bahrain	3.08E-06	0.0922	0.9741
	(2.32E-06)	(0.0620)	(0.0048)
Cyprus	8.61E-07	0.0340	0.9615
	(2.39E-07)	(0.0045)	(0.0048)
Egypt	1.72E-06	0.0312	0.9548
	(1.07E-07)	(0.0018)	(0.0023)
Israel	3.29E-06	0.1672	0.9739
	(2.64E-06)	(0.1211)	(0.0035)
Jordon	4.95E-06	0.1843	0.9741
	(5.43E-06)	(0.1933)	(0.0033)
KSA	1.16E-06	0.0240	0.9662
	(6.89E-08)	(0.0011)	(0.0015)
Kuwait	2.15E-06	0.0612	0.9762
	(1.38E-06)	(0.0334)	(0.0051)
Lebanon	8.79E-07	0.0349	0.9614
	(2.51E-07)	(0.0046)	(0.0048)
Oman	1.41E-06	0.0264	0.9622
	(1.10E-07)	(0.0016)	(0.0022)
Qatar	2.79E-06	0.1717	0.9841
	(1.17E-06)	(0.0729)	(0.0012)
Turkey	8.53E-07	0.0335	0.9616
	(2.29E-07)	(0.0043)	(0.0047)
UAE	1.24E-06	0.0248	0.9648
	(9.73E-08)	(0.0015)	(0.0020)

Table 4.3 displays the findings for the variance equations. The significance of the ARCH term in all cases implies that past price fluctuations influence current

returns.

Likewise, the GARCH term is consistently significant, suggesting ongoing volatility across all examined markets. The near-total sum of the ARCH and GARCH coefficients, approaching 1, highlights the enduring nature of this volatility persistence.

Table 4.4: Hedge, Diversifier and Safe Haven Properties of Gold During Pre COVID-19 Period Mean Equation Baur Model

Country	**Constant**	**RM**	**Q10**	**Q5**	**Q1**
Bahrain	0.0002	0.0153	0.0564	-0.0771	0.0048
	(0.0001)	(0.0386	0.1144)	(0.1225)	(0.0858)
Cyprus	0.0004***	0.0346**	-0.0766	0.0741	-0.0717
	(0.0001)	(0.0169)	(0.0602)	(0.0647)	(0.0456)
Egypt	0.0002**	-0.0030	-0.0211	0.0290	-0.0056
	(0.0001)	(0.0078)	(0.0202)	(0.0237)	(0.0229)
Israel	0.0004***	-0.0074	-0.0291	0.0549	0.0439
	(0.0002)	(0.0167)	(0.0407)	(0.0430)	(0.0380)
Jordon	0.0003***	-0.0011	-0.0165	0.0085	-0.0271
	(0.0001)	(0.0161)	(0.0457)	(0.0516)	(0.0496)
KSA	0.0002**	0.0028	0.0120	-0.0555	0.0110
	(0.0001)	(0.0158)	(0.0499)	(0.0491)	(0.0350)
Kuwait	-0.0001	0.0133	0.0108	-0.0799	0.1058
	(0.0002)	(0.0246)	(0.0672)	(0.0726)	(0.0613)
Lebanon	0.0004***	0.0134	-0.0217	-0.0075	-0.0229
	(0.0001)	(0.0164)	(0.0536)	(0.0593)	(0.0449)
Oman	0.0002	0.0727***	-0.1737**	0.1341	0.0073
	(0.0002)	(0.0265)	(0.0788)	(0.0843)	(0.0554)
Qatar	0.0002*	0.0188*	-0.0412	0.0079	-0.0036
	(0.0001)	(0.0101)	(0.0299)	(0.0323)	(0.0261)
Turkey	0.0005***	0.0134*	0.0401*	-0.0390	-0.0213
	(0.0001)	(0.0071)	(0.0219)	(0.0243)	(0.0203)
UAE	0.0003**	0.0108	0.0073	-0.0412	0.0493
	(0.0002)	(0.0178)	(0.0636)	(0.0669)	(0.0397)

Note: ***, 1% significance level, **, 5% significance level, *, 10% significance level.

Table 4.4 presents the results of the mean equation, showing that gold generally

acts as a weak safe haven across various Middle Eastern stock markets, with some nonlinear relationships affecting its capabilities.

In Bahrain, gold is a weak safe haven at all percentiles (1st, 5th, and 10th), (0.0048, -0.0771, 0.0564), maintaining this property on average returns (0.0153), though it serves only as a weak hedge (0.0002) on average. In Cyprus, gold is also a weak safe haven across all percentiles and average, with a nonlinear relationship observed on average returns (0.0346**), and it does not function as a hedge(0.0004***).

For Egypt and Israel, gold consistently acts as a weak safe haven at the 1st, 5th, and 10th percentiles, holding this property on average returns, but it does not act as a hedge on average for either market. In Jordan, gold remains a weak safe haven across all percentiles, maintaining this status on average returns, though it does not serve as a hedge.

In Saudi Arabia, gold serves as a weak safe haven at all percentiles, with this property holding on average returns, but it does not function as a hedge on average. In Kuwait, gold similarly acts as a weak safe haven across all percentiles and average returns and as a weak hedge on average returns.

For Lebanon, gold remains a weak safe haven at the 1st, 5th, and 10th percentiles, consistently maintaining this role on average returns, but it does not serve as a hedge.

In Oman, gold acts as a strong safe haven at the 10th percentile (-0.1737**), though it weakens to a safe haven at the 5th and 1st percentiles. A nonlinear relationship is observed on average returns, and it only a weak hedge for Oman.

In Qatar, gold functions as a weak safe haven across all percentiles, though a nonlinear relationship on average returns and does not act as a hedge on average. For Turkey, a nonlinear relationship is observed at the 10th percentile and on average, gold is a weak safe haven at the 5th and 1st percentiles but does not serve as a hedge.

For the United Arab Emirates, gold consistently acts as a weak safe haven at each percentile and holds this role on average returns, though it does not function as a hedge.

TABLE 4.5: Variance Equation Baur Model

Country	Constant	ARCH	GARCH
Bahrain	2.13E-06	0.0675	0.9765
	(1.57E-06)	(0.0432)	(0.0050)
Cyprus	7.00E-07	0.0363	0.9608
	(2.32E-07)	(0.0050)	(0.0051)
Egypt	2.08E-06	0.2778	0.9774
	(1.17E-06)	(0.1627)	(0.0023)
Israel	8.42E-07	0.0237	0.9694
	(9.37E-08)	(0.0016)	(0.0021)
Jordon	2.59E-06	0.1350	0.9727
	(2.24E-06)	(0.1069)	(0.0037)
KSA	1.02E-06	0.0230	0.9685
	(6.77E-08)	(0.0011)	(0.0015)
Kuwait	1.52E-06	0.0409	0.9785
	(1.02E-06)	(0.0227)	(0.0062)
Lebanon	7.38E-07	0.0346	0.9628
	(2.37E-07)	(0.0049)	(0.0049)
Oman	1.15E-06	0.0252	0.9657
	(1.06E-07)	(0.0018)	(0.0024)
Qatar	1.79E-06	0.1058	0.9853
	(6.61E-07)	(0.0398)	(0.0012)
Turkey	7.34E-07	0.0334	0.9628
	(2.20E-07)	(0.0047	0.0049)
UAE	1.08E-06	0.0233	0.9680
	(9.38E-08)	(0.0016)	(0.0021)

Table 4.5 outlines the results of the variance equations, where the ARCH term is significant in every case, indicating that previous price movements affect current returns.

Similarly, the GARCH term is significant across all markets, signaling persistent volatility throughout the sample. The sum of the ARCH and GARCH coefficients

is nearly equal to 1, underscoring the prolonged nature of this volatility persistence.

TABLE 4.6: Hedge, Diversifier and Safe Haven Properties of Gold During COVID-19 Period Mean Equation Baur Model

Country	**Constant**	**RM**	**Q10**	**Q5**	**Q1**
Bahrain	0.0001	0.0625	-0.4286	0.5676*	-0.2079
	(0.0004)	(0.0819)	(0.2761)	(0.3050)	(0.2410)
Cyprus	0.0002	-0.0114	-0.0628	-0.0158	0.2010***
	(0.0004)	(0.0386)	(0.1023)	(0.1061)	(0.0684)
Egypt	0.0000	0.0742**	-0.0515	-0.0607	-0.0123
	(0.0004)	(0.0361)	(0.1473)	(0.1489)	(0.0810)
Israel	0.0003	0.0705**	0.0347	-0.0778	-0.0295
	(0.0004)	(0.0324)	(0.0951)	(0.1090)	(0.1450)
Jordon	0.0004	-0.0017	0.3742*	-0.3553	-0.1003
	(0.0004)	(0.0641)	(0.2211)	(0.2325)	(0.6170)
KSA	0.0001	0.0981*	-0.1494	0.2205	-0.1321
	(0.0004)	(0.0519)	(0.1932)	(0.1952)	(0.1465)
Kuwait	0.0003	-0.0274	0.1280	-0.1720	0.2405
	(0.0004)	(0.0751)	(0.2029)	(0.2041)	(0.2520)
Lebanon	0.0009**	-0.0195	0.1618	-0.0958	-0.0597
	(0.0004)	(0.0375)	(0.1346)	(0.1465)	(0.0970)
Oman	0.0004	0.0768	0.3571	-0.3372	0.1145
	(0.0004)	(0.1074)	(0.2912)	(0.3735)	(0.3959)
Qatar	0.0001	0.1232***	-0.0346	0.0765	-0.3567***
	(0.0004)	(0.0399)	(0.1323)	(0.1346)	(0.1034)
Turkey	0.0004	0.0445*	-0.0342	-0.0217	0.0197
	(0.0004)	(0.0250)	(0.0765)	(0.0809)	(0.0633)
UAE	0.0003	0.0545	0.1609	-0.1017	0.0242
	(0.0004)	(0.0529)	(0.2083)	(0.2146)	(0.1591)

Note: ***, 1% significance level, **, 5% significance level, *, 10% significance level

Table 4.6 summarizes the mean equation results, showing that gold generally acts as a weak safe haven across various Middle Eastern markets, with nonlinear relationships influencing its safe-haven properties and in some markets losing its hedging properties.

For Bahrain, gold is a weak safe haven at the 10th and 1st percentiles (-0.4286, -0.2079), maintaining this property on average returns (0.0625), although a nonlinear relationship at the 5th percentile (0.5676*) causes it to lose its safe-haven

role. Gold functions as a weak hedge (0.0001) on average for Bahrain. In Cyprus, gold is a weak safe haven at the 10th and 5th percentiles, holding this status on average returns, but under extreme conditions at the 1st percentile, a nonlinear relationship arises, weakening its safe-haven status. Gold is also a weak hedge on average for Cyprus.

In Egypt, gold acts as a weak safe haven across all percentiles (1st, 5th, and 10th), with a nonlinear relationship observed on average returns. It serves as a weak hedge on average for Egypt. Similarly, for Israel, gold is a weak safe haven across all percentiles, although a nonlinear relationship on average and gold is not a hedge on average.

In Jordan, gold shows a nonlinear relationship at the 10th percentile, while at the 5th and 1st percentiles, it remains a weak safe haven, with this property holding on average returns. Gold is a weak hedge on average for Jordan. In Saudi Arabia, gold acts as a weak safe haven across all percentiles, with a nonlinear relationship on average returns, and a weak hedging role.

For Kuwait, gold is a weak safe haven at the 1st, 5th, and 10th percentiles, consistently maintaining this role on average. Gold also serves as a weak hedge for Kuwait. In Lebanon, gold operates as a weak safe haven at each percentile, sustaining this property on average returns, though it does not function as a hedge on average (0.0009**).

In Oman, gold remains a weak safe haven across all percentiles and maintains this status on average returns, with a weak hedging role on average. For Qatar, gold serves as a weak safe haven at the 10th and 5th percentiles but strengthens to a strong safe haven at the 1st percentile (-0.3567***). However, a nonlinear relationship on average returns causes it to lose its safe-haven role, and it remains a weak hedge on average.

In Turkey, gold is a weak safe haven across all percentiles, though a nonlinear relationship limits its effectiveness on average returns and acts a as a weak hedge on average. For the United Arab Emirates, gold consistently acts as a weak safe haven at each percentile, retaining this role on average returns and serving as a weak hedge.

TABLE 4.7: Variance Equation Baur Model

Country	Constant	ARCH	GARCH
Bahrain	9.30E-06	0.0077	0.9039
	(2.08E-06)	(0.0059)	(0.0214)
Cyprus	2.21E-05	0.0121	0.7728
	(3.17E-06)	(0.0127)	(0.0326)
Egypt	7.19E-06	0.0003	0.9279
	(1.00E-06)	(0.0049)	(0.0107)
Israel	6.06E-06	0.0054	0.9226
	(1.86E-06)	(0.0072)	(0.0228)
Jordon	1.92E-05	0.0022	0.8182
	(3.89E-06)	(0.0095)	(0.0380)
KSA	9.66E-06	0.0148	0.8922
	(2.28E-06)	(0.0065)	(0.0244)
Kuwait	1.30E-05	0.0045	0.8707
	(2.46E-06)	(0.0081)	(0.0250)
Lebanon	8.27E-06	0.0005	0.9292
	(2.71E-06)	(0.0143)	(0.0263)
Oman	9.38E-06	0.0073	0.9007
	(2.22E-06)	(0.0054)	(0.0230)
Qatar	4.46E-06	0.0036	0.9425
	(7.37E-07)	(0.0035)	(0.0100)
Turkey	5.37E-06	0.0043	0.9454
	(1.74E-06)	(0.0113)	(0.0187)
UAE	7.43E-06	0.0064	0.9312
	(2.07E-06)	(0.0058)	(0.0212)

Table 4.7 displays the results of the variance equations. The significance of the ARCH term in all instances suggests that prior price movements influence current returns. Similarly, the GARCH term is significant across each sample market, indicating ongoing volatility. The sum of the ARCH and GARCH coefficients approaches 1, highlighting the persistent, long-term nature of this volatility.

TABLE 4.8: Results Summary for Gold Using the Baur Model

	Bahrain	**Cyprus**	**Egypt**	**Israel**	**Jordon**	**KSA**
Overall						
Hedge	W-H	-	-	-	-	W-H
Safe Haven (RM)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (10)	W-S-H	W-S-H	S-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (05)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (01)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Pre-COVID-19						
Hedge	W-H	-	-	-	-	-
Safe Haven (RM)	W-S-H	-	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (10)	W-S-H	W-S-H	S-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (05)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (01)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
COVID-19						
Hedge	W-H	W-H	W-H	W-H	W-H	W-H
Safe Haven (RM)	W-S-H	W-S-H	-	-	W-S-H	-
Safe Haven (10)	W-S-H	W-S-H	W-S-H	W-S-H	-	W-S-H
Safe Haven (05)	-	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (01)	W-S-H	-	W-S-H	W-S-H	W-S-H	W-S-H

Note: W-S-H (weak safe haven), S-S-H (strong safe haven), W-H (weak hedge), S-H (strong hedge).

TABLE 4.9: Results Summary for Gold Using the Baur Model

	Kuwait	**Lebanon**	**Oman**	**Qatar**	**Turkey**	**UAE**
Overall						
Hedge	W-H	-	-	-	-	-
Safe Haven (RM)	W-S-H	W-S-H	-	-	-	W-S-H
Safe Haven (10)	W-S-H	W-S-H	S-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (05)	W-S-H	W-S-H	W-S-H	W-S-H	S-S-H	W-S-H
Safe Haven (01)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	-
Pre-COVID-19						
Hedge	W-H	-	W-H	-	-	-
Safe Haven (RM)	W-S-H	W-S-H	-	-	-	W-S-H
Safe Haven (10)	W-S-H	W-S-H	S-S-H	W-S-H	-	W-S-H
Safe Haven (05)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (01)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
COVID-19						
Hedge	W-H	-	W-H	W-H	W-H	W-H
Safe Haven (RM)	W-S-H	W-S-H	W-S-H	-	-	W-S-H
Safe Haven (10)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (05)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (01)	W-S-H	W-S-H	W-S-H	S-S-H	W-S-H	W-S-H

Note: W-S-H (weak safe haven), S-S-H (strong safe haven), W-H (weak hedge), S-H (strong hedge).

4.3.1 Hedge, Diversifier and Safe Haven Properties of Gold using Bouri Model

The derived pairwise DCCs are subsequently applied within the Bouri Model to verify the robustness of the initial findings. Tables 4.10 (overall period), 4.11 (pre-COVID-19 period), and 4.12 (COVID-19 period) present the estimates of stock market returns and extreme market conditions, as analyzed through the DCC GARCH Model introduced by Bouri, Molnár, Azzi, Roubaud, and Hagfors (2016).

TABLE 4.10: Hedge, Diversifier and Safe Haven Properties of Gold During Overall Period Using Bouri Model

Country	Constant	Q10	Q5	Q1
Bahrain	0.0176***	-0.3742**	0.1570	0.2107
	(0.0003)	(0.1887)	(0.2213)	(0.1650)
Cyprus	0.0145***	0.0504	-0.1430*	0.0984*
	(0.0002)	(0.0710)	(0.0815)	(0.0567)
Egypt	0.0192***	0.0509**	-0.0323	0.0348*
	(0.0001)	(0.0213)	(0.0252)	(0.0207)
Israel	0.0139***	-0.6648***	0.5249**	0.5911***
	0.0009	0.2157	0.2563	0.2045
Jordon	-0.0008*	-0.0111	-0.0300	-0.0926
	(0.0004)	(0.1553)	(0.1812)	(0.1440)
KSA	0.0083***	-0.0236	-0.0420	0.0457
	(0.0002)	(0.0569)	(0.0634)	(0.0404)
Kuwait	0.0113***	-0.2322	0.1458	-0.2404*
	(0.0003)	(0.1497)	(0.1753)	(0.1406)
Lebanon	-0.0199***	0.2260***	-0.1939***	-0.0066
	(0.0002)	(0.0551)	(0.0641)	(0.0442)
Oman	0.0322***	0.1293	-0.1794	-0.0172
	(0.0002)	(0.1039)	(0.1187)	(0.0733)
Qatar	0.0339***	0.0421	0.1383	0.2514***
	(0.0003)	(0.1087)	(0.1247)	(0.0874)
Turkey	0.0479***	-0.0215	0.1774	0.0570
	(0.0011)	(0.1870)	(0.2228)	(0.1786)
UAE	0.0141***	-0.0005	0.0003	0.0009*
	(0.0000)	(0.0006)	(0.0007)	(0.0005)

Note: ***, 1% significance level, **, 5% significance level, *, 10% significance level

The Bouri Model results in Table 4.10 for the overall period suggest that gold primarily acts as a diversifier across various Middle Eastern stock markets, with its safe-haven properties differing by market conditions and percentile thresholds.

In Bahrain, gold functions as a diversifier (0.0176***) and a strong safe haven at the 10th percentile (-0.3742**), but it weakens to a safe haven at the 5th and 1st percentiles (0.1570, 0.2107).

For Cyprus, gold also acts as a diversifier, showing weak safe-haven characteristics at the 10th percentile, strengthening to a strong safe haven at the 5th percentile, but losing this property under extreme market conditions at the 1st percentile (0.0984*).

In Egypt, gold serves as a diversifier without safe-haven properties at the 10th and 1st percentiles. It holds a weak safe-haven status only at the 5th percentile.

For Israel, gold is a diversifier and a strong safe haven at the 10th percentile but loses its safe-haven role at the 5th and 1st percentiles.

In Jordan, gold acts as a strong hedge (-0.0008*) and a weak safe haven across all percentiles. In Saudi Arabia, gold is a diversifier and remains a weak safe haven across the 10th, 5th, and 1st percentiles.

In Kuwait, gold acts as a diversifier and is a weak safe haven at the 10th and 5th percentiles, strengthening to a strong safe haven under extreme conditions at the 1st percentile.

In Lebanon, gold is a strong hedge, though it does not act as a safe haven at the 10th percentile. It becomes a strong safe haven at the 5th percentile and a weak safe haven at the 1st percentile.

For Oman, gold is a diversifier with weak safe-haven properties across all percentiles. In Qatar, gold acts as a diversifier and a weak safe haven at the 10th and 5th percentiles, losing its safe-haven property at the 1st percentile under extreme conditions.

In Turkey, gold functions as a diversifier and a weak safe haven across all percentiles. Similarly, in the United Arab Emirates, gold acts as a diversifier, maintaining a weak safe-haven role at the 10th and 5th percentiles but losing this property at the 1st percentile during extreme conditions.

TABLE 4.11: Hedge, Diversifier and Safe Haven Properties of Gold During Pre COVID-19 Period Using Bouri Model

Country	Constant	Q10	Q5	Q1
Bahrain	0.0212***	-0.0261	0.0027	0.0179
	(0.0001)	(0.0621)	(0.0739)	(0.0562)
Cyprus	0.0228***	0.0052	-0.0152**	0.0147***
	(0.0000)	(0.0051)	(0.0059)	(0.0041)
Egypt	0.0076***	0.0859*	-0.0343	0.0606
	(0.0002)	(0.0486)	(0.0579)	(0.0485)
Israel	-0.0015	-1.0678***	0.8204**	0.6210**
	(0.0011)	(0.2695)	(0.3190)	(0.2531)
Jordon	-0.0086***	0.0297	-0.0659	0.0395
	(0.0004)	(0.1488)	(0.1728)	(0.1375)
KSA	-0.0038***	-0.0328	-0.0332	0.0518
	0.0002	0.0613	0.0684	0.0441
Kuwait	0.0134***	-0.1225	0.1156	-0.0467
	(0.0003)	(0.1441)	(0.1719)	(0.1449)
Lebanon	-0.0186***	0.0841	0.0396	-0.1080**
	(0.0002)	(0.0640)	(0.0742)	(0.0506)
Oman	0.0286***	0.0135	-0.0855	-0.0306
	(0.0003)	(0.1281)	(0.1449)	(0.0874)
Qatar	0.0308***	-0.0744	0.2899**	0.1391*
	(0.0003)	(0.1002)	(0.1142)	(0.0794)
Turkey	0.0538***	-0.0428	0.3334	-0.0039
	(0.0012)	(0.2031)	(0.2429)	(0.1971)
UAE	0.0055***	0.0253	0.0030	-0.0366
	(0.0001)	(0.0346)	(0.0399)	(0.0288)

Note: ***, 1% significance level, **, 5% significance level, *, 10% significance level

The Bouri Model results in Table 4.11 for the pre-COVID-19 period indicate that gold primarily functions as a diversifier across various Middle Eastern stock markets, with its safe-haven and hedge properties varying across different percentiles and market conditions.

In Bahrain, gold acts as a diversifier (0.0212***) and a weak safe haven across all percentiles (10th, 5th, and 1st), (-0.0261, 0.0027, 0.0179). For Cyprus, gold is also a diversifier, showing weak safe-haven characteristics at the 10th percentile, strengthening to a strong safe haven at the 5th percentile (-0.0152**), but losing its safe-haven role under extreme conditions at the 1st percentile (0.0147***).

In Egypt, gold serves as a diversifier but does not act as a safe haven at the 10th percentile. It holds a weak safe-haven status at the 5th and 1st percentiles. In Israel, gold acts as a weak hedge on average (-0.0015), offering a strong safe haven at the 10th percentile but not at the 5th or 1st percentiles.

For Jordan, gold functions as a strong hedge (-0.0086***) while also being a weak safe haven across all percentiles. In Saudi Arabia, gold similarly serves as a strong hedge and maintains a weak safe-haven status at all percentiles. In Kuwait, gold acts as a diversifier and a weak safe haven at each percentile. For Lebanon, gold is a strong hedge and a weak safe haven at the 10th and 5th percentiles, while acting as a strong safe haven under extreme market conditions at the 1st percentile.

For Oman, gold is a diversifier with weak safe-haven properties across all percentiles. In Qatar, gold provides a weak safe haven at the 10th percentile but loses its safe-haven role at the 5th and 1st percentiles. In Turkey, gold is a diversifier and maintains a weak safe-haven status across all percentiles. Similarly, in the United Arab Emirates, gold functions as a diversifier and a weak safe haven across the 10th, 5th, and 1st percentiles.

The Bouri Model results in Table 4.12 for the COVID-19 period suggest that gold generally acts as a diversifier across various Middle Eastern stock markets, with safe-haven and hedge properties varying depending on market conditions and intensity.

In Bahrain, gold serves as a diversifier (0.0118***) and is a weak safe haven at the 10th percentile (-0.7166), strengthening to a strong safe haven at the 5th percentile (-3.1396**) but losing its safe-haven property under extreme conditions at the 1st percentile (3.8639***). For Cyprus, gold functions as a strong hedge (-0.0082***) while also acting as a weak safe haven across all percentiles. In Egypt, gold is a diversifier and maintains a weak safe-haven status across the 10th, 5th, and 1st percentiles. A similar pattern is observed in Israel, where gold acts as a diversifier, a weak safe haven at the 10th and 5th percentiles, and a strong safe haven under extreme conditions at the 1st percentile.

TABLE 4.12: Hedge, Diversifier and Safe Haven Properties of Gold During COVID-19 Period Using Bouri Model

Country	**Constant**	**Q10**	**Q5**	**Q1**
Bahrain	0.0118***	-0.7166	-3.1396**	3.8639***
	(0.0019)	(1.2194)	(1.3999)	(1.0430)
Cyprus	-0.0082***	0.1657	0.2766	0.2329
	(0.0013)	(0.2623)	(0.3126)	(0.2521)
Egypt	0.0090***	0.0365	-0.0301	0.0113
	(0.0001)	(0.0293)	(0.0353)	(0.0273)
Israel	0.1080***	0.1771	-0.2862	-1.1143***
	(0.0017)	(0.3930)	(0.4727)	(0.3946)
Jordon	0.0992***	-0.0635	0.7783	0.6100
	(0.0022)	(0.9174)	(1.1237)	(0.9629)
KSA	0.1030***	-0.1728	-0.2078	0.2751
	(0.0018)	(0.6611)	(0.7611)	(0.5314)
Kuwait	-0.0020	-1.2997	1.2639	0.5023
	(0.0020)	(0.9415)	(1.0530)	(0.7309)
Lebanon	-0.0496***	-0.4992	0.1508	0.4852
	(0.0033)	(0.9523)	(1.1231)	(0.7850)
Oman	0.0863***	-1.5075*	-0.5328	0.9192
	(0.0014)	(0.9129)	(1.0871)	(0.8749)
Qatar	0.0696***	-0.2739	-0.2338	0.9524
	(0.0027)	(1.1144)	(1.3425)	(1.1194)
Turkey	0.0517***	0.0129	-0.2971	0.1441
	(0.0020)	(0.4348)	(0.4870)	(0.3226)
UAE	0.1006***	-0.0096	-0.1941	-0.1936**
	(0.0003)	(0.1487)	(0.1648)	(0.0940)

Note: ***, 1% significance level, **, 5% significance level, *, 10% significance level

For Jordan and Saudi Arabia, gold behaves as a diversifier and a weak safe haven across all percentiles. In Kuwait, gold is a weak hedge (-0.0020) and a weak safe haven at each percentile.

In Lebanon, gold serves as a strong hedge while also acting as a weak safe haven across all percentiles. For Oman, gold is a diversifier and provides a strong safe haven at the 10th percentile, though it weakens to a safe haven at the 5th and 1st percentiles.

In Qatar, gold acts as a diversifier and is a weak safe haven across all percentiles. For Turkey, gold similarly functions as a diversifier with weak safe-haven properties at each percentile level. In the United Arab Emirates, gold acts as a diversifier and a weak safe haven at the 10th and 5th percentiles, strengthening to a strong safe haven under extreme conditions at the 1st percentile.

Tables 4.13 and 4.14 present a summary of the results derived from the Bouri Model, analyzing the roles of oil and gold against Middle Eastern stock markets. The results are categorized into three distinct periods: overall, pre-COVID-19, and during COVID-19.

These tables focus exclusively on the properties of oil and gold as hedge assets, diversifiers, and safe havens. The analysis revealed that hedges and safe havens are further categorized within the model based on their strength, distinguishing between weak and strong classifications.

Hedges are identified as either weak or strong, depending on their performance relative to the stock market. Similarly, safe havens are categorized as weak or strong based on their ability to provide protection during periods of market turmoil.

These detailed classifications are presented in the tables, reflecting the findings comprehensively. Investors can make informed decisions based on the results presented. By understanding whether oil and gold act as weak or strong hedges and safe havens, they can optimize their portfolios accordingly.

This classification helps investors assess the protective role of these assets during different market conditions, enabling them to strategize effectively and mitigate risks.

Table 4.13: Results Summary for Gold Using the Bouri Model

	Bahrain	**Cyprus**	**Egypt**	**Israel**	**Jordon**	**KSA**
Overall						
Hedge/D	D	D	D	D	S-H	D
Safe Haven (10)	S-S-H	W-S-H	-	S-S-H	W-S-H	W-S-H
Safe Haven (05)	W-S-H	S-S-H	W-S-H	-	W-S-H	W-S-H
Safe Haven (01)	W-S-H	-	-	-	W-S-H	W-S-H
Pre-COVID-19						
Hedge/D	D	D	D	W-H	S-H	S-H
Safe Haven (10)	W-S-H	W-S-H	-	S-S-H	W-S-H	W-S-H
Safe Haven (05)	W-S-H	S-S-H	W-S-H	-	W-S-H	W-S-H
Safe Haven (01)	W-S-H	-	W-S-H	-	W-S-H	W-S-H
COVID-19						
Hedge/D	D	S-H	D	D	D	D
Safe Haven (10)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (05)	S-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (01)	-	W-S-H	W-S-H	S-S-H	W-S-H	W-S-H

Note: W-S-H (weak safe haven), S-S-H (strong safe haven), W-H (weak hedge), S-H (strong hedge), D (diversified).

Table 4.14: Results Summary for Gold Using the Bouri Model

	Kuwait	**Lebanon**	**Oman**	**Qatar**	**Turkey**	**UAE**
Overall						
Hedge/D	D	S-H	D	D	D	D
Safe Haven (10)	W-S-H	-	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (05)	W-S-H	S-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (01)	S-S-H	W-S-H	W-S-H	-	W-S-H	-
Pre-COVID-19						
Hedge/D	D	S-H	D	D	D	D
Safe Haven (10)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (05)	W-S-H	W-S-H	W-S-H	-	W-S-H	W-S-H
Safe Haven (01)	W-S-H	S-S-H	W-S-H	-	W-S-H	W-S-H
COVID-19						
Hedge/D	W-H	S-H	D	D	D	D
Safe Haven (10)	W-S-H	W-S-H	S-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (05)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (01)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	S-S-H

Note: W-S-H (weak safe haven), S-S-H (strong safe haven), W-H (weak hedge), S-H (strong hedge), D (diversified).

4.4 Hedge, Diversifier and Safe Haven Properties of Oil using Baur Model

Tables 4.15 (overall period), 4.17 (pre-COVID-19 period), and 4.19 (COVID-19 period) display the estimates for Oil and Middle Eastern equity markets according to the Baur Model. These tables include estimates for c1 (stock market returns) and measurements for extreme market conditions, specifically c2 for the 10% quantile, c3 for the 5% quantile, and c4 for the 1% quantile. Additionally, each table reports the variance equation.

TABLE 4.15: Hedge, Diversifier and Safe Haven Properties of Oil During Overall Period Mean Equation Baur Model

Country	Constant	RM	Q10	Q5	Q1
Bahrain	0.0006**	0.0087	0.1491	-0.2856	0.0614
	(0.0002)	(0.0654)	(0.1942)	(0.2150)	(0.1967)
Cyprus	0.0006**	0.0876***	-0.0521	0.0282	-0.1552
	(0.0003)	(0.0307)	(0.0977)	(0.1046)	(0.0787)
Egypt	0.0006**	0.0544**	-0.0867	0.1719***	0.2087***
	(0.0003)	(0.0250)	(0.0620)	(0.0644)	(0.0465)
Israel	0.0008***	0.0856***	0.0363	0.0771	-0.1438**
	(0.0002)	(0.0235)	(0.0579)	(0.0629)	(0.0659)
Jordon	0.0007***	-0.0018	-0.0271	0.1157	-0.1080
	(0.0002)	(0.0308)	(0.0884)	(0.0939)	(0.0868)
KSA	0.0005**	0.1063***	0.1304	-0.1938**	0.0712**
	(0.0003)	(0.0265)	(0.0834)	(0.0832)	(0.0351)
Kuwait	0.0006**	0.0331	0.0363	-0.1668	0.1373
	(0.0003)	(0.0457)	(0.1308)	(0.1380)	(0.1320)
Lebanon	0.0007***	0.0413	-0.0450	0.0399	-0.1482*
	(0.0002)	(0.0294)	(0.1006)	(0.1134)	(0.0783)
Oman	0.0007***	-0.0118	-0.1846	0.3291***	-0.0008
	(0.0002)	(0.0386)	(0.1154)	(0.1276)	(0.0914)
Qatar	0.0006**	0.1180***	-0.0437	-0.0998	0.5888***
	(0.0003)	(0.0280)	(0.0780)	(0.0869)	(0.0593)
Turkey	0.0007***	0.1006***	-0.0056	-0.0521	0.0740**
	(0.0002)	(0.0155)	(0.0425)	(0.0468)	(0.0376)
UAE	0.0007***	0.0182	0.0869	-0.0319	-0.0495
	(0.0002)	(0.0255)	(0.0777)	(0.0834)	(0.0721)

Note: ***, 1% significance level, **, 5% significance level, *, 10% significance level

Table 4.15 presents the results of the mean equation, indicating that oil primarily serves as a weak safe haven across various Middle Eastern markets, with nonlinear relationships observed in some cases.

For Bahrain, oil is a weak safe haven at the 1st, 5th, and 10th percentiles (0.0614, -0.2856, 0.1491) and on average market returns (0.0087), though it does not function as a hedge (0.0006**). In Cyprus, oil remains a weak safe haven across all percentiles, with a nonlinear relationship present on average returns (0.0876***), but it is not a hedge.

In Egypt, a nonlinear relationship is noted on average returns and at the 1st and 5th percentiles, while oil serves as a weak safe haven only at the 10th percentile and is not a hedge on average. For Israel, a nonlinear relationship exists on average returns (0.0856***), with oil acting as a weak safe haven at the 10th and 5th percentiles and as a strong safe haven under extreme market conditions at the 1st percentile (-0.1438**), though it does not serve as a hedge on average.

In Jordan, oil consistently functions as a weak safe haven across all percentiles and on average returns, without acting as a hedge. For Saudi Arabia, oil displays a nonlinear relationship on average returns, maintaining this property under extreme conditions at the 1st percentile, while acting as a weak safe haven at the 10th percentile and a strong safe haven at the 5th percentile. However, it is not a hedge on average.

In Kuwait, oil remains a weak safe haven at the 1st, 5th, and 10th percentiles and on average returns, though it is not a hedge. For Lebanon, oil is a weak safe haven at the 10th and 5th percentiles and a strong safe haven at the 1st percentile under extreme conditions, but it does not act as a hedge on average.

In Oman, oil is a weak safe haven at the 10th and 1st percentiles, a property that holds on average returns. A nonlinear relationship is observed at the 5th percentile, and oil does not act as a hedge on average. For Qatar, oil is a weak safe haven at the 10th and 5th percentiles, losing this property under extreme conditions at the 1st percentile and on average due to a nonlinear relationship, and it is not a hedge on average.

In Turkey, oil functions as a weak safe haven at the 10th and 5th percentiles but loses this property under extreme conditions at the 1st percentile and on average due to a nonlinear relationship. Oil is not a hedge on average in Turkey. Finally, for the United Arab Emirates, oil is a weak safe haven at the 1st, 5th, and 10th percentiles and on average returns, though it does not serve as a hedge.

Table 4.16: Variance Equation Baur Model

Country	**Constant**	**ARCH**	**GARCH**
Bahrain	6.48E-06	0.1318	0.9320
	(2.70E-06)	(0.0416)	(0.0078)
Cyprus	4.53E-06	0.0716	0.9235
	(1.10E-06)	(0.0071)	(0.0071)
Egypt	6.35E-06	0.0380	0.9520
	(3.92E-07)	(0.0019)	(0.0019)
Israel	8.12E-06	0.1011	0.9394
	(2.50E-06)	(0.0236)	(0.0061)
Jordon	6.11E-06	0.0836	0.9473
	(1.93E-06)	(0.0184)	(0.0056)
KSA	3.37E-06	0.0411	0.9547
	(3.84E-07)	(0.0019)	(0.0020)
Kuwait	1.10E-05	0.2125	0.9253
	(6.80E-06)	(0.1159)	(0.0088)
Lebanon	4.29E-06	0.0715	0.9244
	(1.05E-06)	(0.0070)	(0.0068)
Oman	7.83E-06	0.1019	0.9441
	(2.64E-06)	(0.0265)	(0.0058)
Qatar	4.16E-06	0.0417	0.9516
	(3.76E-07)	(0.0022)	(0.0023)
Turkey	4.84E-06	0.0736	0.9202
	(1.10E-06)	(0.0070)	(0.0071)
UAE	1.12E-05	0.1511	0.9423
	(5.03E-06)	(0.0594)	(0.0059)

Table 4.16 provides the results of the variance equations, showing that the ARCH term is significant in every case, suggesting that historical price changes influence current returns. Likewise, the GARCH term is significant across all sample markets, pointing to persistent volatility. The combined sum of the ARCH and

GARCH coefficients is close to 1, indicating the enduring nature of this volatility over the long term.

TABLE 4.17: Hedge, Diversifier and Safe Haven Properties of Oil During Pre COVID-19 Period Mean Equation Baur Model

Country	**Constant**	**RM**	**Q10**	**Q5**	**Q1**
Bahrain	0.0003	-0.0078	0.0555	-0.2210	0.1059
	(0.0003)	(0.0703)	(0.2173)	(0.2371)	(0.1983)
Cyprus	0.0005**	0.0644*	0.1420	-0.1242	-0.1588*
	(0.0003)	(0.0357)	(0.1167)	(0.1269)	(0.0954)
Egypt	0.0004**	0.0291*	-0.0365	0.0425	-0.0367
	(0.0002)	(0.0170)	(0.0460)	(0.0514)	(0.0457)
Israel	0.0006***	0.0825***	0.0087	0.1449**	-0.1864***
	(0.0002)	(0.0259)	(0.0613)	(0.0659)	(0.0690)
Jordon	0.0005**	0.0045	-0.0508	0.1200	-0.1079
	(0.0002)	(0.0322)	(0.0912)	(0.0970)	(0.0894)
KSA	0.0004	0.0817***	0.0962	-0.1796**	0.1091***
	(0.0003)	(0.0268)	(0.0848)	(0.0841)	(0.0367)
Kuwait	0.0002	0.0420	-0.0291	-0.1518	0.1590
	(0.0003)	(0.0476)	(0.1355)	(0.1463)	(0.1279)
Lebanon	0.0005*	0.0482	0.0618	-0.0947	-0.0815
	(0.0003)	(0.0328)	(0.1137)	(0.1280)	(0.0870)
Oman	0.0006***	-0.0103	-0.1666	0.3310**	-0.0385
	(0.0002)	(0.0398)	(0.1195)	(0.1307)	(0.0917)
Qatar	0.0005*	0.0938***	-0.0393	-0.1009	0.6479***
	(0.0003)	(0.0294)	(0.0819)	(0.0917)	(0.0615)
Turkey	0.0005*	0.1043***	-0.0244	-0.0286	0.1211***
	(0.0003)	(0.0161)	(0.0448)	(0.0496)	(0.0397)
UAE	0.0005*	0.0247	0.1293	-0.1632	0.4867***
	(0.0003)	(0.0328)	(0.1190)	(0.1259)	(0.0518)

Note: ***, 1% significance level, **, 5% significance level, *, 10% significance level

Table 4.17 details the mean equation results, showing oil's role as a weak or strong safe haven across various percentiles, with its relationship to Middle Eastern markets often exhibiting nonlinear characteristics.

In Bahrain, oil acts as a weak safe haven across the 1st, 5th, and 10th percentiles (0.1059, -0.2210, 0.0555) maintaining this status on average returns (-0.0078) while also serving as a weak hedge (0.0003). For Cyprus, oil is a weak safe haven at the 10th and 5th percentiles, strengthening to a strong safe haven under extreme conditions at the 1st percentile (-0.1588*). A nonlinear relationship exists between oil and Cyprus's market returns on average (0.0644*), but oil does not act as a hedge (0.0005**) for Cyprus. In Egypt, oil serves as a weak safe haven across all percentiles (1st, 5th, and 10th), with a nonlinear relationship present on average returns. Oil does not function as a hedge in Egypt. For Israel, oil is a weak safe haven at the 10th percentile and exhibits a nonlinear relationship at the 5th percentile and on average, while becoming a strong safe haven at the 1st percentile during extreme market conditions. Oil is not a hedge on average for Israel.

For Jordan, oil remains a weak safe haven across all percentiles, a property that holds on average returns, though oil does not act as a hedge for Jordan. In Saudi Arabia, oil is a weak safe haven at the 10th percentile, a strong safe haven at the 5th percentile, and displays a nonlinear relationship at the 1st percentile and on average. On average, oil is a weak hedge for Saudi Arabia. In Kuwait, oil functions as a weak safe haven across the 1st, 5th, and 10th percentiles, maintaining this status on average returns as well as serving as a weak hedge. For Lebanon, oil acts as a weak safe haven across all percentiles, with this property remaining intact on average; however, oil does not serve as a hedge.

For Oman, oil is a weak safe haven at the 10th percentile and exhibits a nonlinear relationship at the 5th percentile. At the 1st percentile, oil continues as a weak safe haven under extreme market conditions and on average returns, but it does not function as a hedge on average. In Qatar, oil provides a weak safe haven at the 10th and 5th percentiles, with a nonlinear relationship at the 1st percentile. This property is retained on average, but oil does not act as a hedge in Qatar.

For Turkey, oil is a weak safe haven at the 10th and 5th percentiles, while showing a nonlinear relationship at the 1st percentile under extreme conditions. This safe-haven status persists on average, though oil is not a hedge in Turkey. Lastly, in the United Arab Emirates, oil serves as a weak safe haven at the 10th and 5th percentiles, and this property remains on average returns. Under extreme conditions at the 1st percentile, a nonlinear relationship is observed, yet oil does not act as a hedge.

TABLE 4.18: Variance Equation Baur Model

Country	**Constant**	**ARCH**	**GARCH**
Bahrain	3.88E-06	0.1091	0.9480
	(2.17E-06)	(0.0418)	(0.0082)
Cyprus	2.31E-06	0.0585	0.9404
	(7.90E-07)	(0.0065)	(0.0063)
Egypt	5.11E-06	0.1615	0.9575
	(3.35E-06)	(0.0837)	(0.0048)
Israel	3.09E-06	0.0685	0.9592
	(1.27E-06)	(0.0162)	(0.0052)
Jordon	3.24E-06	0.0694	0.9574
	(1.29E-06)	(0.0158)	(0.0052)
KSA	1.36E-06	0.0330	0.9673
	(2.39E-07)	(0.0016)	(0.0016)
Kuwait	1.08E-05	0.2408	0.9395
	(1.05E-05)	(0.2103)	(0.0100)
Lebanon	1.75E-06	0.0529	0.9468
	(6.61E-07)	(0.0060)	(0.0058)
Oman	3.88E-06	0.0792	0.9577
	(1.65E-06)	(0.0217)	(0.0053)
Qatar	3.04E-06	0.0922	0.9741
	(3.95E-07)	(0.0620)	(0.0048)
Turkey	2.44E-06	0.0571	0.9408
	(7.84E-07)	(0.0063)	(0.0063)
UAE	1.72E-06	0.0414	0.9589
	(3.47E-07)	(0.0018)	(0.0018)

Table 4.18 presents the variance equation results, indicating that the ARCH term is significant in all cases, which suggests that past price changes affect current returns. Similarly, the GARCH term is significant across each sample market,

signaling consistent volatility over time. The sum of the ARCH and GARCH coefficients approaches 1, underscoring the persistent, long-term nature of this volatility.

TABLE 4.19: Hedge, Diversifier and Safe Haven Properties of Oil During COVID-19 Period Mean Equation Baur Model

Country	**Constant**	**RM**	**Q10**	**Q5**	**Q1**
Bahrain	0.0020***	0.1125	0.4293	-0.3916	-0.3767
	(0.0007)	(0.1892)	(0.6177)	(0.6784)	(0.5273)
Cyprus	0.0022***	0.0479	-0.1535	0.1725	-0.2761
	(0.0009)	(0.0680)	(0.1800)	(0.1919)	(0.1797)
Egypt	0.0014	0.1325	0.2787	-0.0552	-0.3585
	(0.0009)	(0.0845)	(0.2941)	(0.3399)	(0.2224)
Israel	0.0021***	0.1803***	0.1676	-0.2746	0.2250
	(0.0007)	(0.0639)	(0.1777)	(0.2081)	(0.2063)
Jordon	0.0024***	-0.0397	0.2232	0.0614	-0.2026
	(0.0007)	(0.1086)	(0.4176)	(0.4467)	(0.4341)
KSA	0.0016**	0.3978***	-0.2511	0.4101	-0.4974
	(0.0007)	(0.1042)	(0.2923)	(0.3057)	(0.5939)
Kuwait	0.0021***	0.0981	0.1914	-0.2403	0.1251
	(0.0007)	(0.1358)	(0.4157)	(0.4533)	(0.4649)
Lebanon	0.0032***	-0.1848**	0.4196	-0.2060	-0.2605
	(0.0009)	(0.0736)	(0.2982)	(0.3284)	(0.2336)
Oman	0.0018***	-0.0895	-0.4411	-0.1746	1.3937**
	(0.0007)	(0.1620)	(0.4947)	(0.5617)	(0.5489)
Qatar	0.0007	0.4478**	-0.6905**	0.8247***	-1.1923***
	(0.0007)	(0.0956)	(0.2850)	(0.2988)	(0.2472)
Turkey	0.0027***	0.0439	0.4556***	-0.4347***	-0.2236*
	(0.0008)	(0.0638)	(0.1537)	(0.1556)	(0.1266)
UAE	0.0026***	0.0750	0.2692	0.0786	0.2889
	(0.0008)	(0.1001)	(0.355)4	(0.3934)	(0.3052)

Note: ***, 1% significance level, **, 5% significance level, *, 10% significance level

Table 4.19 presents the mean equation results, highlighting oil's role as a weak safe haven across various Middle Eastern stock markets with consistency at multiple percentiles, though it generally does not act as a hedge on average returns.

For Bahrain, oil is a weak safe haven at the 1st, 5th, and 10th percentiles (-0.3767, -0.3916, 0.4293) and a property that remains steady on average market returns (0.1125), but oil does not function as a hedge (0.0020***). In Cyprus, oil similarly acts as a weak safe haven across all three percentiles, with this property persisting on average, although it is not a hedge.

In Egypt, oil is also a weak safe haven at each percentile, maintaining this property on average returns, while acting as a weak hedge on average (0.0014).

For Israel, oil serves as a weak safe haven across all percentiles and nonlinear relationship observed on average returns (0.1803***) but does not perform as a hedge on average returns.

In Jordan, oil acts as a weak safe haven at the 1st, 5th, and 10th percentiles and on average returns; however, oil is not a hedge.

For Saudi Arabia, oil maintains a weak safe-haven status at each percentile, with a nonlinear relationship on average returns, and does not act as a hedge. In Kuwait, oil consistently performs as a weak safe haven across all percentiles, with this property holding steady on average, though it does not serve as a hedge.

In Lebanon, oil remains a weak safe haven at all percentiles, and a strong safe haven status that persists on average (-0.1848**), yet it does not act as a hedge. In Oman, oil is a weak safe haven at the 10th and 5th percentiles, with this property holding on average returns. However, under extreme market conditions at the 1st percentile, a nonlinear relationship is present, and oil does not act as a hedge.

For Qatar, oil functions as a strong safe haven at the 10th and 1st percentiles, although it loses its safe-haven property at the 5th percentile and on average returns, where a nonlinear relationship emerges. On average, oil remains a weak hedge in Qatar. In Turkey, a nonlinear relationship exists at the 10th percentile, and oil is a strong safe haven at the 5th and 1st percentiles, though on average returns, oil remains a weak safe haven and does not act as a hedge. Finally, for

the United Arab Emirates, oil is a weak safe haven across all percentiles, with this status remaining on average market returns, though oil is not a hedge.

TABLE 4.20: Variance Equation Baur Model

Country	Constant	ARCH	GARCH
Bahrain	2.61E-05	0.0960	0.8894
	(1.16E-05)	(0.0386)	(0.0287)
Cyprus	4.75E-05	0.1034	0.8204
	(1.57E-05)	(0.0338)	(0.0391)
Egypt	9.09E-06	0.0332	0.9503
	(1.12E-06)	(0.0045)	(0.0037)
Israel	4.13E-05	0.1310	0.8660
	(2.08E-05)	(0.0614)	(0.0342)
Jordon	3.91E-05	0.1047	0.8798
	(2.15E-05)	(0.0532)	(0.0392)
KSA	2.61E-05	0.0954	0.8854
	(1.14E-05)	(0.0377)	(0.0297)
Kuwait	2.77E-05	0.1027	0.8867
	(1.23E-05)	(0.0428)	(0.0284)
Lebanon	3.93E-05	0.0966	0.8548
	(1.49E-05)	(0.0326)	(0.0366)
Oman	3.25E-05	0.0983	0.8913
	(1.58E-05)	(0.0451)	(0.0296)
Qatar	4.98E-06	0.0609	0.9314
	(6.66E-07)	(0.0059)	(0.0048)
Turkey	2.55E-05	0.1122	0.8524
	(9.04E-06)	(0.0301)	(0.0305)
UAE	2.19E-05	0.1072	0.8742
	(9.10E-06)	(0.0339	0.0296)

Table 4.20 summarizes the results of the variance equations, showing that the ARCH term is significant in every instance, indicating that previous price movements affect current returns. Additionally, the GARCH term is significant across all markets, highlighting ongoing volatility. The combined ARCH and GARCH coefficients are close to 1, emphasizing the persistent, long-term nature of this volatility.

TABLE 4.21: Results Summary for Oil Using the Baur Model

	Bahrain	**Cyprus**	**Egypt**	**Israel**	**Jordon**	**KSA**
Overall						
Hedge	-	-	-	-	-	-
Safe Haven (RM)	W-S-H	-	-	-	W-S-H	-
Safe Haven (10)	W-S-H	W-S-H	-	W-S-H	W-S-H	W-S-H
Safe Haven (05)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	S-S-H
Safe Haven (01)	W-S-H	W-S-H	-	S-S-H	W-S-H	-
Pre-COVID-19						
Hedge	W-H	-	-	-	-	W-H
Safe Haven (RM)	W-S-H	-	-	-	W-S-H	-
Safe Haven (10)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (05)	W-S-H	W-S-H	W-S-H	-	W-S-H	S-S-H
Safe Haven (01)	W-S-H	S-S-H	W-S-H	S-S-H	W-S-H	-
COVID-19						
Hedge	-	-	W-H	-	-	-
Safe Haven (RM)	W-S-H	W-S-H	W-S-H	-	W-S-H	-
Safe Haven (10)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (05)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (01)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H

Note: W-S-H (weak safe haven), S-S-H (strong safe haven), W-H (weak hedge), S-H (strong hedge).

TABLE 4.22: Results Summary for Oil Using the Baur Model

	Kuwait	**Lebanon**	**Oman**	**Qatar**	**Turkey**	**UAE**
Overall						
Hedge	-	-	-	-	-	-
Safe Haven (RM)	W-S-H	W-S-H	W-S-H	-	-	W-S-H
Safe Haven (10)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (05)	W-S-H	W-S-H	-	W-S-H	W-S-H	W-S-H
Safe Haven (01)	W-S-H	S-S-H	W-S-H	-	-	W-S-H
Pre-COVID-19						
Hedge	W-H	-	-	-	-	-
Safe Haven (RM)	W-S-H	W-S-H	W-S-H	-	-	W-S-H
Safe Haven (10)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (05)	W-S-H	W-S-H	-	W-S-H	W-S-H	W-S-H
Safe Haven (01)	W-S-H	W-S-H	W-S-H	-	-	-
COVID-19						
Hedge	-	-	-	W-H	-	-
Safe Haven (RM)	W-S-H	S-S-H	W-S-H	-	W-S-H	W-S-H
Safe Haven (10)	W-S-H	W-S-H	W-S-H	S-S-H	-	W-S-H
Safe Haven (05)	W-S-H	W-S-H	W-S-H	-	S-S-H	W-S-H
Safe Haven (01)	W-S-H	W-S-H	-	S-S-H	S-S-H	W-S-H

Note: W-S-H (weak safe haven), S-S-H (strong safe haven), W-H (weak hedge), S-H (strong hedge).

4.4.1 Hedge, Diversifier and Safe Haven Properties of Oil using Bouri Model

The pairwise DCCs obtained are subsequently applied in the Bouri Model to assess the robustness of the previous findings. Table 4.23 (overall period), Table 4.24 (pre-COVID-19 period), and Table 4.25 (COVID-19 period) present the estimates for stock market returns and extreme market conditions, based on the DCC GARCH Model introduced by Bouri et al. (2016).

TABLE 4.23: Hedge, Diversifier and Safe Haven Properties of Oil During Overall Period using Bouri Model

Country	Constant	Q10	Q5	Q1
Bahrain	0.0119***	-0.0353	0.0282	0.0821*
	(0.0001)	(0.0480)	(0.0562)	(0.0419)
Cyprus	0.0402***	0.0189	-0.0263	-0.3076***
	(0.0003)	(0.1086)	(0.1246)	(0.0867)
Egypt	0.0598***	-0.3244***	0.0872	-0.2822**
	(0.0006)	(0.1251)	(0.1483)	(0.1219)
Israel	0.1125***	-0.2106	0.0834	-0.0826
	(0.0009)	(0.2290)	(0.2720)	(0.2171)
Jordon	0.0328***	0.1114	-0.1613	-0.1506
	(0.0004)	(0.1550)	(0.1808)	(0.1437)
KSA	0.0816***	-0.3877**	0.4142*	0.0363
	(0.0006)	(0.1905)	(0.2123)	(0.1354)
Kuwait	0.0128***	-0.0662	-0.0991	0.2516**
	(0.0003)	(0.1252)	(0.1464)	(0.1100)
Lebanon	0.0026***	-0.1747	0.1631	0.1084
	(0.0003)	(0.1066)	(0.1242)	(0.0855)
Oman	0.0439***	-0.2731	-0.3491	0.2144
	(0.0004)	(0.2327)	(0.2658)	(0.1641)
Qatar	0.1108***	0.7433***	0.1123	-1.0446***
	(0.0009)	(0.2782)	(0.3191)	(0.2236)
Turkey	0.1163***	0.4412**	-0.2868	-0.0792
	(0.0011)	(0.1920)	(0.2288)	(0.1835)
UAE	0.0597***	0.0851	-0.4240**	-0.4902***
	(0.0004)	(0.1496)	(0.1719)	(0.1202)

Note: ***, 1% significance level, **, 5% significance level, *, 10% significance level

The results of the Bouri Model in Table 4.23 for the overall period suggest that oil generally acts as a diversifier across various Middle Eastern stock markets, with its safe-haven properties differing based on market conditions and intensities.

In Bahrain, oil serves as a diversifier (0.0119***) and a weak safe haven at the 10th and 5th percentiles (-0.0353, 0.0282) though it loses its safe-haven quality under extreme market conditions at the 1st percentile (0.0821*). For Cyprus, oil acts as a diversifier and is a weak safe haven at the 10th and 5th percentiles but strengthens to a strong safe haven at the 1st percentile (-0.3076***). In Egypt, oil also serves as a diversifier and is a strong safe haven at the 10th and 1st percentiles, while it shows a weaker safe-haven effect at the 5th percentile.

In Israel, oil functions as a diversifier and remains a weak safe haven across the 10th, 5th, and 1st percentiles. Similarly, in Jordan, oil maintains a diversifying role, acting as a weak safe haven across all three percentiles. In Saudi Arabia, oil is diversifier and oil is a strong safe haven at the 10th percentile, loses this property at the 5th percentile, but serves as a weak safe haven under extreme conditions at the 1st percentile.

In Kuwait, oil acts as a diversifier and a weak safe haven at the 10th and 5th percentiles, but it loses this role at the 1st percentile and on average. Lebanon and Oman see oil consistently as a diversifier with weak safe-haven properties across all percentiles. In Qatar, oil is a diversifier but does not serve as a safe haven at the 10th percentile. It does act as a weak safe haven at the 5th percentile and a strong safe haven under extreme conditions at the 1st percentile.In Turkey, oil acts as a diversifier but lacks safe-haven properties at the 10th percentile. However, it functions as a weak safe haven at the 5th and 1st percentiles. In the United Arab Emirates, oil serves as a diversifier and a weak safe haven at the 10th percentile, while strengthening to a strong safe haven at the 5th and 1st percentiles.

The Bouri Model results in Table 4.24 for the pre-COVID-19 period indicate that oil acts as a hedge or diversifier across various Middle Eastern stock markets, with its safe-haven characteristics differing based on market intensity levels.

For Bahrain, oil functions as a strong hedge (-0.0018***) and a weak safe haven across all percentiles (10th, 5th, and 1st), (-0.0524, 0.0809, 0.0118). In Cyprus, oil serves as a diversifier (0.0366***) and maintains a weak safe-haven status across all percentiles. Similarly, in Egypt, oil is a diversifier and provides a weak safe haven at each percentile. Israel and Jordan exhibit similar patterns, with oil acting as a diversifier and a weak safe haven across all percentiles.

Table 4.24: Hedge, Diversifier and Safe Haven Properties of Oil During Pre COVID-19 Period using Bouri Model

Country	Constant	Q10	Q5	Q1
Bahrain	-0.0018***	-0.0524	0.0809	0.0118
	(0.0001)	(0.0579)	(0.0690)	(0.0525)
Cyprus	0.0366***	-0.1757	-0.0583	0.0076
	(0.0004)	(0.1861)	(0.2142)	(0.1501)
Egypt	0.0162***	-0.0505	0.0200	-0.0395
	(0.0004)	(0.0742)	(0.0883)	(0.0740)
Israel	0.1090***	-0.2549	0.1265	0.0662
	(0.0010)	(0.2616)	(0.3097)	(0.2457)
Jordon	0.0251***	0.0675	-0.1557	-0.0060
	(0.0004)	(0.1479)	(0.1718)	(0.1367)
KSA	0.0640***	-0.5297***	0.3892**	0.0702
	(0.0005)	(0.1374)	(0.1532)	(0.0987)
Kuwait	-0.0252***	-0.1180	-0.1105	0.3149
	(0.0006)	(0.2658)	(0.3163)	(0.2419)
Lebanon	0.0187***	0.0014***	-0.0014**	-0.0001
	(0.0000)	(0.0005)	(0.0006)	(0.0004)
Oman	0.0456***	-0.9804***	0.5113	-0.2419
	(0.0007)	(0.3584)	(0.4054)	(0.2445)
Qatar	0.0820***	0.4311	0.6059	-1.3224***
	(0.0012)	(0.3543)	(0.4039)	(0.2809)
Turkey	0.1231***	0.4292**	-0.2182	-0.1041
	(0.0013)	(0.2149)	(0.2570)	(0.2085)
UAE	0.0548***	-0.1776	0.0397	-0.5264***
	(0.0006)	(0.1978)	(0.2284)	(0.1648)

Note: ***, 1% significance level, **, 5% significance level

The Bouri Model results in Table 4.24 for the pre-COVID-19 period indicate that oil acts as a hedge or diversifier across various Middle Eastern stock markets, with its safe-haven characteristics differing based on market intensity levels.

In Saudi Arabia, oil acts as a diversifier and oil is a strong safe haven at the 10th percentile (-0.5297***) but loses this role at the 5th percentile (0.3892**), only

maintaining a weak safe-haven status under extreme conditions at the 1st percentile. In Kuwait, oil acts as a strong hedge and a weak safe haven across all percentiles. For Lebanon, oil serves as a diversifier and lost being safe-haven properties at the 10th percentile. It becomes a strong safe haven at the 5th percentile but weakens at the 1st percentile. In Oman, oil diversifies market movements and acts as a strong safe haven at the 10th percentile, while it is a weak safe haven at the 5th and 1st percentiles.

In Qatar, oil functions as a diversifier and a weak safe haven at the 10th and 5th percentiles, strengthening to a strong safe haven under extreme market conditions at the 1st percentile. Turkey follows a similar trend, where oil acts as a diversifier without safe-haven properties at the 10th percentile but provides weak safe-haven support at the 5th and 1st percentiles.

In the United Arab Emirates, oil serves as a diversifier and a weak safe haven at the 10th and 5th percentiles, while strengthening to a strong safe haven at the 1st percentile under severe market stress.

The Bouri Model results in Table 4.25 for the COVID-19 period indicate that oil generally acts as a diversifier across various Middle Eastern stock markets, with its safe-haven qualities varying based on specific market conditions and percentile thresholds.

In Bahrain, oil serves as a diversifier (0.0832***) and provides weak safe-haven support at the 10th percentile (-0.0589), strengthening to a strong safe haven at the 5th percentile (-1.1328**) but losing its safe-haven properties at the 1st percentile (0.6342*) under extreme conditions. For Cyprus, oil functions as a diversifier and a weak safe haven at both the 10th and 1st percentiles, but it acts as a strong safe haven at the 5th percentile.

In Egypt, oil diversifies market movements and holds a weak safe-haven status across all percentiles (10th, 5th, and 1st). A similar trend is observed in Jordan and Kuwait, where oil acts as a diversifier and maintains weak safe-haven properties at all levels. For Israel, oil serves as a diversifier and is a weak safe haven at the 10th and 5th percentiles, while strengthening to a strong safe haven at the 1st percentile during extreme market conditions.

In Saudi Arabia, oil is a diversifier and oil is a strong safe haven at the 10th percentile but loses this property at the 5th percentile, only acting as a weak safe haven at the 1st percentile. In Lebanon, oil operates as a strong hedge (-0.1088***) but only provides weak safe-haven support across all percentiles.

In Oman and Qatar, oil diversifies the market and holds weak safe-haven status at the 10th, 5th, and 1st percentiles. For Turkey, oil is a diversifier and oil is a weak safe haven at the 10th and 5th percentiles but becomes a strong safe haven at the 1st percentile under extreme conditions. Lastly, in the United Arab Emirates, oil serves as a diversifier with weak safe-haven qualities across all tested percentiles

TABLE 4.25: Hedge, Diversifier and Safe Haven Properties of Oil During COVID-19 Period using Bouri Model

Country	**Constant**	**Q10**	**Q5**	**Q1**
Bahrain	0.0832***	-0.0589	-1.1328**	0.6342*
	(0.0006)	(0.3874)	(0.4448)	(0.3314)
Cyprus	0.0502***	0.2018	-0.8830**	0.3466
	(0.0017)	(0.3315)	(0.3950)	(0.3186)
Egypt	0.1106***	-0.0292	-0.1544	0.3578
	(0.0016)	(0.4513)	(0.5423)	(0.4206)
Israel	0.1617***	1.2516	-0.7835	-3.4856***
	(0.0057)	(1.3267)	(1.5956)	(1.3321)
Jordon	0.0958***	-0.1673	0.3940	0.9068
	(0.0015)	(0.6244)	(0.7648)	(0.6553)
KSA	0.2078***	-0.6191**	0.5864**	-0.1599
	(0.0007)	(0.2483)	(0.2858)	(0.1996)
Kuwait	0.1160***	-0.2688	-0.2304	-0.4491
	(0.0011)	(0.5236)	(0.5856)	(0.4065)
Lebanon	-0.1088***	0.3164	-0.2868	-0.1061
	(0.0008)	(0.2183)	(0.2575)	(0.1800)
Oman	0.0367***	-0.0116	-0.3703	-0.1622
	(0.0015)	(0.9923)	(1.1816)	(0.9510)
Qatar	0.1439***	2.9782	-3.5756	1.4813
	(0.0050)	(2.0856)	(2.5127)	(2.0950)
Turkey	0.1012***	-0.3832	0.5985	-0.6664**
	(0.0019)	(0.4139)	(0.4636)	(0.3070)
UAE	0.1083***	-0.9297	0.1216	-0.3838
	(0.0019)	(0.8633)	(0.9565)	(0.5458)

Note: ***, 1% significance level, **, 5% significance level, *, 10% significance level

Table 4.26: Results Summary for Oil Using the Bouri Model

	Bahrain	**Cyprus**	**Egypt**	**Israel**	**Jordon**	**KSA**
Overall						
Hedge/D	D	D	D	D	D	D
Safe Haven (10)	W-S-H	W-S-H	S-S-H	W-S-H	W-S-H	S-S-H
Safe Haven (05)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	-
Safe Haven (01)	-	S-S-H	S-S-H	W-S-H	W-S-H	W-S-H
Pre-COVID-19						
Hedge/D	S-H	D	D	D	D	D
Safe Haven (10)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	S-S-H
Safe Haven (05)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	-
Safe Haven (01)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
COVID-19						
Hedge/D	D	D	D	D	D	D
Safe Haven (10)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	S-S-H
Safe Haven (05)	S-S-H	S-S-H	W-S-H	W-S-H	W-S-H	-
Safe Haven (01)	-	W-S-H	W-S-H	S-S-H	W-S-H	W-S-H

Note: W-S-H (weak safe haven), S-S-H (strong safe haven), W-H (weak hedge), S-H (strong hedge), D (diversifier)

Table 4.27: Results Summary for Oil Using the Bouri Model

	Kuwait	**Lebanon**	**Oman**	**Qatar**	**Turkey**	**UAE**
Overall						
Hedge/D	D	D	D	D	D	D
Safe Haven (10)	W-S-H	W-S-H	W-S-H	-	-	W-S-H
Safe Haven (05)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	S-S-H
Safe Haven (01)	-	W-S-H	W-S-H	S-S-H	W-S-H	S-S-H
Pre-COVID-19						
Hedge/D	S-H	D	D	D	D	D
Safe Haven (10)	W-S-H	-	S-S-H	W-S-H	-	W-S-H
Safe Haven (05)	W-S-H	S-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (01)	W-S-H	W-S-H	W-S-H	S-S-H	W-S-H	S-S-H
COVID-19						
Hedge/D	D	S-H	D	D	D	D
Safe Haven (10)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (05)	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H	W-S-H
Safe Haven (01)	W-S-H	W-S-H	W-S-H	W-S-H	S-S-H	W-S-H

Note: W-S-H (weak safe haven), S-S-H (strong safe haven), W-H (weak hedge), S-H (strong hedge), D (diversifier)

4.5 Optimal Weight Allocation

The model for optimal weight allocation for oil and gold and for all periods is taken from the study of (Chemkha et al. 2021).

4.5.1 Optimal Weight Allocation for Oil and Gold During Overall Period

TABLE 4.28: Allocation of Optimal Portfolio Weights for Overall Period (Oil) Optimal Weights

Optimal Weights				
Middle Eastern Countries	**W.oil**	**W.stock**	**Std.Oil**	**Std.Stock**
Bahrain (BA)	0.9394	0.0606	1.16%	0.14%
Cyprus (CSE)	0.8298	0.1702	0.80%	0.62%
Egypt (EGX30)	0.7023	0.2977	0.76%	0.59%
Israel (TA90)	0.7797	0.2203	1.00%	0.55%
Jordon (ASE)	0.8600	0.1400	0.81%	0.45%
KSA (TASI)	0.7903	0.2097	0.87%	0.80%
Kuwait (BKA)	0.8612	0.1388	1.33%	0.32%
Lebanon (BSE)	0.8068	0.1932	1.01%	0.74%
Oman (MSX30)	0.9092	0.0908	0.95%	0.52%
Qatar (QE)	0.8185	0.1815	0.84%	0.68%
Turky (BIST100)	0.5797	0.4203	0.93%	0.82%
United Arab Emirates (ADX)	0.8332	0.1668	0.94%	0.58%

The allocation weights during overall period between stocks and oil in several Middle Eastern nations are shown in the Table 4.28, together with the corresponding standard deviations, illustrating the varying levels of reliance on stocks versus oil as an asset. Bahrain's structure is steady yet heavily dependent on oil, as seen by its high oil weight of 93.94% and relatively low stock allocation (6.06%), as

well as its low oil (1.16%) and stock (0.14%) standard deviations. With a high oil weight (90.92%) and moderate volatility (0.95% for oil and 0.52% for equities), Oman has a similar trend, indicating a preference for oil despite the remarkable stability of the stock market. Turkey is notable for having the largest stock allocation (42.03%) and the lowest oil weight (57.97%), but it also has the highest volatility in both stocks (0.82%) and oil (0.93%), suggesting a more risk-sensitive but balanced portfolio.

Although Kuwait maintains a high oil allocation (86.12%), it has lower stock volatility (0.32%) but higher oil market volatility (1.33%), indicating more exposure to the volatility of oil. Jordan has the lowest stock volatility (0.45%) among the UAE, Cyprus, and Jordan, which all have moderate oil weights (around 83–86%) and reasonably balanced stock volatilities, suggesting varied economic reliance. Egypt and Israel have somewhat diversified allocations, with stock weights of around 22-30%, and moderate volatility levels, reflecting less dependency on oil alone. Finally, Saudi Arabia, Lebanon, and Qatar exhibit balanced weights and moderate volatilities, with Lebanon showing higher stock volatility (0.74%) while Qatar maintains a substantial reliance on oil. These allocations highlight a mix of oil-dominant and diversified strategies across Middle Eastern markets, shaped by each country's economic focus and asset stability.

The allocation weights during Overall period between equities and gold in Middle Eastern nations are displayed in Table 4.29, along with standard deviations. With a weight of 82.08% and the lowest volatility for gold (0.22%), Bahrain has the largest reliance on gold and the lowest volatility for stocks (0.14%), indicating a steady yet heavily gold-focused portfolio. Oman comes in second with a 74.20% gold weight and moderate volatility (0.28% for gold and 0.52% for stocks), suggesting that even though they are somewhat exposed to stock market swings, they still choose gold. Turkey, on the other hand, has the lowest percentage of gold (26.70%) and the highest percentage of stocks (73.30%), along with higher volatility in both gold (0.30%) and stocks (0.82%), indicating a more balanced but riskier strategy. With significant stock allocations, moderate volatility, and lower gold weights (36.65% and 45.89%, respectively), Egypt and Israel likewise exhibit diversified portfolios that are less dependent on gold.

TABLE 4.29: Allocation of Optimal Portfolio Weights for Overall Period (Gold)

Optimal Weights				
Middle Eastern Countries	**W.Gold**	**W.stock**	**Std.Gold**	**Std.Stock**
Bahrain (BA)	0.8208	0.1792	0.22%	0.14%
Cyprus (CSE)	0.5975	0.4025	0.30%	0.62%
Egypt (EGX30)	0.3665	0.6335	0.29%	0.59%
Israel (TA90)	0.4589	0.5411	0.29%	0.55%
Jordon (ASE)	0.6554	0.3446	0.30%	0.45%
KSA (TASI)	0.5130	0.4870	0.29%	0.80%
Kuwait (BKA)	0.6271	0.3729	0.20%	0.32%
Lebanon (BSE)	0.5759	0.4241	0.31%	0.74%
Oman (MSX30)	0.7420	0.2580	0.28%	0.52%
Qatar (QE)	0.5436	0.4564	0.30%	0.68%
Turky (BIST100)	0.2670	0.7330	0.30%	0.82%
United Arab Emirates (ADX)	0.5965	0.4035	0.28%	0.58%

A balanced risk approach is demonstrated by Kuwait and Jordan's moderate gold allocations (between 62 and 65%) and comparatively low volatility levels. With gold weights ranging from 57 to 60% and more stock volatility (especially in Lebanon at 0.74%), the United Arab Emirates UAE, Cyprus, and Lebanon appear to have more exposure to the stock market. Kingdom of Saudi Arabia (KSA) and Qatar maintain almost similar holdings of stocks and gold, although Saudi Arabia's stock volatility (0.80%) is significantly higher, suggesting a dynamic exposure to both. With some nations favoring gold for stability while others maintain sizeable stock allocations, this variety of allocations highlights the variability of risk preferences and hedging techniques across Middle Eastern markets.

4.5.2 Optimal Weight Allocation for Oil and Gold During Pre COVID-19 Period

TABLE 4.30: Allocation of Optimal Portfolio Weights for Pre COVID-19 Period (Oil) Optimal Weights

Optimal Weights				
Middle Eastern Countries	**W.oil**	**W.stock**	**Std.Oil**	**Std.Stock**
Bahrain (BA)	0.9268	0.0732	0.81%	0.10%
Cyprus (CSE)	0.8425	0.1575	0.78%	0.54%
Egypt (EGX30)	1.0000	0.0000	0.60%	0.00%
Israel (TA90)	0.7757	0.2243	0.80%	0.56%
Jordon (ASE)	0.8484	0.1516	0.79%	0.47%
KSA (TASI)	0.7635	0.2365	0.69%	0.85%
Kuwait (BKA)	0.8189	0.1811	0.96%	0.31%
Lebanon (BSE)	0.8248	0.1752	0.83%	0.72%
Oman (MSX30)	0.8974	0.1026	0.77%	0.57%
Qatar (QE)	0.8898	0.1102	0.42%	0.76%
Turky (BIST100)	0.5688	0.4312	0.77%	0.86%
United Arab Emirates (ADX)	0.8147	0.1853	0.76%	0.56%

Each market's preference for oil as a stabilizing asset against stocks is reflected in the different allocations highlighted in this Table 4.30 of the best weights for stocks and oil among Middle Eastern nations. Egypt's entire reliance on oil is demonstrated by its 100% allocation to oil and 0% to equities, which have no exposure to the stock market and just 0.60 percent volatility in oil. Bahrain comes in second with a very low stock weight (7.32%) and a high oil allocation (92.68%), suggesting a heavy reliance on oil and low stock volatility (0.10%). A strong commitment to oil with little exposure to stocks is suggested by Oman and Qatar's high oil weights (89.74% and 88.98%, respectively) and comparatively low oil volatility (0.77% for Oman and 0.42% for Qatar). Due to the high volatility

of both oil (0.77%) and stock (0.86%), Turkey has the lowest oil weight (56.88%) and the greatest stock allocation (43.12%), indicating a more balanced but riskier approach.

With oil weights of 76.35% and 77.57%, respectively, and greater stock volatilities (0.85% for Kingdom Saudi Arabia (KSA) and 0.56% for Israel), Saudi Arabia and Israel also have somewhat diversified allocations, suggesting balanced yet dynamic market dependencies. With moderate oil allocations (between 81 and 85 percent) and varying volatility levels, Lebanon, Kuwait, and the United Arab Emirates (UAE) have restricted but fairly diversified stock exposure. With moderate volatility and a somewhat lesser reliance on oil (84.25% and 84.84%, respectively), Cyprus and Jordan demonstrate a solid strategy that is somewhat reliant on stock market success. This variation in ideal weights demonstrates how different Middle Eastern nations balance stock market exposure and oil stability according to their own market structures and risk tolerances.

Table 4.31 Each Middle Eastern nation's reliance on gold vs equity markets is reflected in the recommended weight allocations for gold and equities, which demonstrate a diverse approach to portfolio weight allocation. Despite gold's moderate volatility (0.61%), Egypt has a strong preference for gold as a stabilizing asset, as seen by the country's 100% gold allocation and lack of stock exposure. Bahrain comes in second with a low stock weight (18.29%) and a high gold allocation (81.71%), as well as low volatility (0.22% for gold and 0.10% for stocks), indicating a cautious strategy centered on the stability of gold.

Oman's substantial gold allocation (72.88%) and modest volatility (0.30% for gold and 0.57% for equities) suggest that the country prefers gold while maintaining a certain level of stock exposure. On the other hand, Turkey has the highest stock weight (73.13%) and the lowest gold weight (26.87%), suggesting a more risk-sensitive yet balanced strategy because of the higher volatility of both stocks (0.86%) and gold (0.32%). With stock market volatility above gold volatility (0.85% for Saudi Arabia and 0.56% for Israel), Israel and Kingdom of Saudi Arabia (KSA) exhibit about identical allocations to gold and stocks (around 47–50%), indicating diverse strategy and increased market dynamics.

TABLE 4.31: Allocation of Optimal Portfolio Weights for Pre COVID-19 Period (Gold)

Optimal Weights				
Middle Eastern Countries	**W.Gold**	**W.stock**	**Std.Gold**	**Std.Stock**
Bahrain (BA)	0.8171	0.1829	0.22%	0.10%
Cyprus (CSE)	0.6315	0.3685	0.31%	0.54%
Egypt (EGX30)	1.0000	0.0000	0.61%	0.00%
Israel (TA90)	0.4744	0.5256	0.31%	0.56%
Jordon (ASE)	0.6457	0.3543	0.31%	0.47%
KSA (TASI)	0.4971	0.5029	0.31%	0.85%
Kuwait (BKA)	0.5764	0.4236	0.16%	0.31%
Lebanon (BSE)	0.6111	0.3889	0.33%	0.72%
Oman (MSX30)	0.7288	0.2712	0.30%	0.57%
Qatar (QE)	0.5280	0.4720	0.33%	0.76%
Turky (BIST100)	0.2687	0.7313	0.32%	0.86%
United Arab Emirates (ADX)	0.5871	0.4129	0.30%	0.56%

A controlled exposure to stocks is shown by the moderate gold weights (around 58–65%) and balanced volatilities displayed by Jordan, Lebanon, and the United Arab Emirates (UAE). With gold weights ranging from 52 to 58%, Qatar and Kuwait have a similar mixed allocation pattern with different volatility profiles, indicating that they maintain a balanced strategy. Cyprus exhibits a strategic preference for stability while permitting substantial exposure to the stock market, as evidenced by its moderate gold allocation (63.15%) and comparatively high stock volatility (0.54%). These differences in the proportions of gold and stocks

show different levels of asset dependency and risk tolerance in the Middle Eastern markets, as nations modify their reliance on gold and stocks to maintain portfolio stability.

4.5.3 Optimal Weight Allocation for Oil and Gold During COVID-19 Period

TABLE 4.32: Allocation of Optimal Portfolio Weights for COVID-19 Period (Oil)

Optimal Weights				
Middle Eastern Countries	**W.oil**	**W.stock**	**Std.Oil**	**Std.Stock**
Bahrain (BA)	0.9687	0.0313	1.31%	0.25%
Cyprus (CSE)	0.7507	0.2493	0.87%	0.82%
Egypt (EGX30)	0.8345	0.1655	1.26%	0.36%
Israel (TA90)	0.8216	0.1784	1.44%	0.45%
Jordon (ASE)	0.9186	0.0814	0.54%	0.31%
KSA (TASI)	0.9290	0.0710	1.28%	0.39%
Kuwait (BKA)	0.9421	0.0579	1.31%	0.35%
Lebanon (BSE)	0.7705	0.2295	1.50%	0.50%
Oman (MSX30)	0.9588	0.0412	1.25%	0.15%
Qatar (QE)	0.9361	0.0639	1.24%	0.26%
Turky (BIST100)	0.6828	0.3172	1.42%	0.61%
United Arab Emirates (ADX)	0.9067	0.0933	1.34%	0.62%

Table 4.32 highlights the importance of oil in regional markets by showing the ideal weight distributions for equities and oil in portfolios throughout Middle Eastern nations, along with the corresponding standard deviations. With modest stock weights and remarkably high oil allocations (96.87%, 95.88%, and 92.90%, respectively), Bahrain, Oman, and Kingdom of Saudi Arabia (KSA) demonstrate their reliance on oil as a major asset with comparatively low stock market volatility and

exposure. With high oil weights of 93.61% and 94.21 percent, respectively, and oil volatility of 1.24 and 1.31%, Qatar and Kuwait also demonstrate confidence in the stability of oil relative to the stock market. Turkey, on the other hand, has the largest stock weight (31.72%) and the lowest oil allocation (68.28%), indicating a more diversified strategy and higher volatility in both assets (1.42% for oil and 0.61% for stocks). Lebanon, which has the highest oil volatility at 1.50%, and Cyprus both exhibit moderate stock allocations (24.93% and 22.95%, respectively), striking a balance between their reliance on oil and their high exposure to stock market volatility. A more balanced strategy is suggested by Israel and Egypt's moderate oil weights (82.16% and 83.45%) and somewhat elevated stock allocations (17.84% and 16.55%), both of which exhibit notable oil volatility. Using oil as a steady anchor with limited volatility, Jordan and the United Arab Emirates maintain high oil allocations (91.86% and 90.67%, respectively) with minimal stock exposure. Depending on economic interconnections and volatility tolerance, each country's approach to managing portfolio risk is reflected in this spectrum of allocations, which emphasize either stability through large oil weights or diversification by adding additional companies to the portfolio.

TABLE 4.33: Allocation of Optimal Portfolio Weights for COVID-19 Period (Gold)

Optimal Weights				
Middle Eastern Countries	**W.Gold**	**W.stock**	**Std.Gold**	**Std.Stock**
Bahrain (BA)	0.8180	0.1820	0.18%	0.25%
Cyprus (CSE)	0.4088	0.5912	0.35%	0.82%
Egypt (EGX30)	0.4370	0.5630	0.11%	0.36%
Israel (TA90)	0.4051	0.5949	0.19%	0.45%
Jordon (ASE)	0.7110	0.2890	0.29%	0.31%
KSA (TASI)	0.6040	0.3960	0.19%	0.39%
Kuwait (BKA)	0.6926	0.3074	0.15%	0.35%
Lebanon (BSE)	0.4427	0.5573	0.16%	0.50%
Oman (MSX30)	0.8154	0.1846	0.18%	0.15%
Qatar (QE)	0.6609	0.3391	0.14%	0.26%
Turky (BIST100)	0.2838	0.7162	0.18%	0.61%
UAE (ADX)	0.6215	0.3785	0.18%	0.62%

A range of preferences for gold as a stabilizing asset against stocks as growth assets, together with corresponding volatilities, are displayed in table 4.33, which

offers the best weight allocations between gold and stocks in Middle Eastern nations. With low stock weights and the largest allocations to gold (81.80% and 81.54%), Bahrain and Oman appear to be heavily dependent on the stability of gold, especially given Oman's unusually low stock volatility (0.15%). Using gold as the main asset in their portfolios to control volatility, Jordan and Kuwait likewise exhibit high gold allocations (71.10% and 69.26%) with minimal stock exposure. Turkey, on the other hand, has the highest stock allocation (71.62%) and the lowest gold weight (28.38%), indicating a diversified but risk-sensitive strategy given the high stock volatility (0.61%). A balanced approach with substantial stock market exposure is indicated by the comparatively lower gold weights (40–44%) and higher stock allocations of Cyprus, Israel, and Lebanon, particularly Cyprus and Israel, which allocate approximately 59% to stocks and experience significant stock volatility (0.82% and 0.45%, respectively).

With modest gold allocations (60.40% and 62.15%, respectively), the Kingdom of Saudi Arabia (KSA) and the United Arab Emirates (UAE) exhibit a well-rounded strategy that balances stock exposure with gold stability while reducing volatility. A conservative approach is shown in Qatar's preference for gold (66.09%) and comparatively low volatility for both assets. Egypt has the lowest gold volatility (0.11%), indicating a strategy that takes advantage of both stock exposure and gold's stability, despite having a moderate allocation to both assets (43.70% in gold and 56.30% in stocks). With decisions between gold and equities influenced by regional market volatility and economic frameworks, these allocations represent each nation's distinct approach to risk management.

Chapter 5

Conclusion and Suggestions

5.1 Conclusion

This research study analyzes the role of Oil and Gold as a hedge, diversifier, or a safe haven against the Middle Eastern stock markets using daily returns from January 2000 to December 2023, except two countries, Bahrain (May 2010 to December 2023) and Kuwait (December 2012 to December 2023). The Middle Countries include the following Seventeen countries, Bahrain, Cyprus, Egypt, Iran, Iraq, Israel, Jordon, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirate and Yemen. Five counties have been dropped form the sample due to not availability of data the following countries are Iraq, Syria, Palestine and Yemen due to war conditions and Iran due to sanctions. This study examines whether oil or gold offers refuge to investors against the losses in the stock market of Middle East countries. It is very important for investors to safeguard their investment from big losses, they are exploring areas to save their wealth and diversify their portfolios due volatility and uncertainty in the Middle East stock markets. Although both gold and oil have different characteristics, gold and oil are both different investment options that are frequently used for safe haven, diversification and hedging purposes across the globe.

This study covered three-time frames first overall period (2000-2023), second prior to COVID-19 (2000-March 11, 2020) and third during COVID-19 (March 11, 2020-May 5,2023) to examine the properties of oil and gold as a hedge, diversifier or

a safe haven. During overall period by using Baur Model gold is a weak hedge only for three countries, Bahrain, Kingdom of Saudi Arabia (KSA) and Kuwait and safe haven for all countries at extreme market conditions. Oil does not act a hedge for all markets and acts as safe haven at extreme market conditions for Middle Eastern Stocks.

Properties of oil and gold as a hedge, diversifier and safe haven using Baur Model in the duration of prior to COVID-19 (2000-March 11, 2020) also discussed in the study. Gold is a weak hedge for Bahrain, Kuwait and Oman, however oil acts as a safe haven for all markets of Middles Eastern countries at extreme market conditions. In this period Oil is weak hedge for Bahrain, Kingdom of Saudi Arabia and Kuwait and safe haven for all counties at extreme market conditions.

The third period of this study is during the COVID-19 (March 11, 2020-May 5,2023) pandemic. This study examined that gold is hedge for all countries except Lebanon during COVID-19 and gold is a safe haven for all countries. The results obtained from Baur Model represents that Oil is hedge for only two counties Egypt and Qatar, however oil is safe haven for all middle Eastern countries during COVID-19.

This study also examines these properties of oil and gold during overall period as hedge diversifier and safe haven by using Bouri Model. Gold is a hedge only for two countries Jordon and Lebanon and it holds the property of diversifier for other countries, however gold is safe haven at extreme market conditions for all markets in the Middle East. Oil is diversifier for all the market of Middle East and at extreme market conditions it serve as safe haven against stocks for the region of study. The properties of oil and gold using Bouri Model are also examined during the period of prior to COVID-19. Oil is hedge only for two markets including Bahrain and Kuwait, however it is diversifier for remain countries of study in the Middle East and safe haven at extreme market conditions. Gold is diversifier for four countries (Israel, Jordon, Kingdom of Saudi Arabia and Lebanon) and diversifier for remain countries, it is safe haven for all countries.

In the period of COVID-19 pandemic oil is hedge only for Lebanon and diversifier for remaining countries in the middle East and at extreme market conditions it served as safe haven. Gold is hedge only for three countries Cyprus, Kuwait and

Lebanon and diversifier for rest of the countries and at extreme market conditions safe haven for all countries in the period of COVID-19 pandemic.

The last discussion of this study is the allocation of optimal weights. This study proposed the weights for oil and gold for three periods of examining. During the overall period, oil was highly weighted across Middle Eastern countries, particularly in Bahrain (93.94%) and Oman (90.92%), reflecting a reliance on oil with minimal exposure to stocks. In contrast, Turkey held the lowest oil allocation (57.97%) with the highest stock allocation (42.03%), suggesting a balanced yet riskier approach. Moving to the pre-COVID-19 period, countries like Egypt entirely favored oil (100% weight), showcasing a complete reliance on oil over stocks. Similar to the overall period, Turkey maintained the highest stock allocation (43.12%) while Kuwait and Jordan adopted a moderate approach, with substantial oil allocations (81–84%) yet lower oil volatilities. During the COVID-19 period, oil's weight intensified further in countries such as Bahrain (96.87%) and Oman (95.88%) to hedge against heightened stock market volatility, particularly in regions like Qatar and Saudi Arabia, reflecting economic uncertainties. Turkey and Lebanon retained diversified weights with higher exposure to stocks, marking a more dynamic market response to the crisis.

For overall period allocations, Bahrain stood out with a high gold weight (82.08%), reflecting a strategic focus on gold as a stabilizing asset amidst low stock volatility. Countries like Oman (74.20%) and Jordan (65.54%) also emphasized gold in their portfolios, while Turkey held the highest stock allocation (73.30%) and the lowest in gold (26.70%), indicating a balanced but risk-sensitive portfolio. In the pre-COVID-19 period, Egypt heavily weighted gold (100%) with no stock exposure, mirroring Bahrain's cautious strategy (81.71%). Saudi Arabia and Israel, however, favored balanced allocations between gold and stocks, indicative of a more dynamic risk approach. During the COVID-19 period, Bahrain and Oman continued their reliance on gold as a primary asset (over 81%), with Jordan and Kuwait following closely. Turkey once again demonstrated the highest allocation to stocks (71.62%), representing a more diversified but volatile strategy. These differences illustrate how Middle Eastern markets vary in their hedging strategies, choosing gold for stability or embracing stock exposure for higher risk.

5.2 Suggestions

5.2.1 Bahrain

Oil has continuously demonstrated significant allocations throughout all eras, especially at times of market volatility, thus investors concentrating on Bahrain should give it top priority in their portfolios. Oil was a strong hedge against stock risks, with minimal volatility and a total allocation of more than 90%. With a weight of more than 80%, gold is also strongly advised for diversification, suggesting that Bahrain's economy gains from stability through gold as well. Oil's allocation increased to 96.87% even during COVID-19, highlighting its function as a major diversifier. Thus, holding a sizable amount of both gold and oil can offer investors effective risk protection for the Bahraini market. Oil and Gold both have the qualities of Safe havens on percentiles.

5.2.2 Cyprus

Investors are encouraged to adopt a balanced strategy for Cyprus. With an average allocation of more than 80% over the whole period, oil acts as a reliable diversifier; nevertheless, Cyprus also has a significant equity exposure, offering chances for diversified growth. The gold's allotment was moderate, suggesting a secondary function as a diversifier. While gold weight dropped to 40.88% during COVID-19 and a strong hedge, investors might think about reducing their exposure to gold during periods of high volatility and somewhat raising it during times of market stress, as seen by the pre-COVID-19 period when it soared to 63.15%. Cyprus's diverse asset strategy is supported by this equitable allocation. Oil and Gold both have the qualities of Safe havens on percentiles.

5.2.3 Egypt

For portfolio stability, investors in Egypt should prioritize oil. With a 100% allocation, the nation showed a heavy reliance on oil, particularly prior to COVID-19, highlighting the major function of oil as a diversifier. Oil was marginally reduced

to 83.45% by crisis adjustments, indicating that it is still the primary asset even in times of extreme volatility. Additionally, gold is not advised for this market, prior to COVID-19 allocation was 100% during times of crisis its allocation reduced to 43.70%. Depending on the state of the economy, investors looking for low volatility and some diversification should give priority to oil with a moderate amount of exposure to gold. Oil has the qualities of Safe havens on percentiles.

5.2.4 Israel

Investors should keep modest holdings of both gold and oil for diversification plan in Israel. Given the reliability of oil, Israel has continuously utilized it as a diversifier, holding 77.97% overall and rising to 82.16% during the COVID-19 period. With an allocation of more than 45%, gold played a supplemental function as a diversifier. In order to preserve portfolio resilience in the Israeli market, investors should keep using gold and oil to diversify their holdings, particularly during market turbulence. Gold is a safe haven for Israel.

5.2.5 Jordan

Jordan makes a compelling argument for investors to give oil first priority while also using gold as a hedge and diversifier. Jordan's allocation of 86.00% to oil for the entire time rose to 91.86% during COVID-19, highlighting the vital role that oil plays as a diversified.

Given that it maintained weights of roughly 65.54% overall, rising during times of severe volatility, gold is advised at a significant allocation. Investors should use gold's diversification advantages to maintain substantial oil allocations for a stable Jordanian portfolio, particularly during volatile markets.

5.2.6 Kingdom of Saudi Arabia (KSA)

Given that oil consistently serves as a diversifier and that its weights reached 92.90% during COVID-19, investors in Saudi Arabia should keep a sizable allocation in oil. High oil allocations were likewise supported during the pre-COVID-19

and overall periods, suggesting that this asset was stable. With a suggested allocation of roughly 51.30%, which can increase to 60.40% during volatile times, gold is a useful hedge and diversifier. Prioritizing oil and adding gold for diversification in portfolios aimed at the Saudi market is consistent with the market characteristics of that nation. Oil is a safe haven on percentiles.

5.2.7 Kuwait

With an overall allocation of 86.12%, investors are urged to concentrate primarily on oil in Kuwait. This allocation is further increased during economic downturns, as evidenced by the COVID-19 period allocation of 94.21%. With a steady allocation of roughly 62.71% overall and a modest increase during volatility, gold plays a crucial role as a diversifier. For investors with a concentration on Kuwait, this combination of large allocations to gold and oil offers a low-risk, well-balanced portfolio strategy. Gold is a safe haven or Kuwaiti market on percentiles.

5.2.8 Lebanon

With high allocations that average 80.68% overall and only marginally decline during COVID-19 to allow for stock exposure, Lebanon is a reliable oil diversifier and hedge alternative. In addition, gold serves as a hedge and is advised at a rate of 57.59% in stable circumstances. Gold was a steady addition for stability prior to COVID-19, with its weight rising marginally to 61.11%. For diverse, consistent returns, investors should place a high priority on oil as a diversifier and balance it with a modest holding in gold. Gold and oil both have the properties of safe haven on percentiles.

5.2.9 Oman

For investors seeking allocations that are reliant on diversifiers, Oman makes a compelling argument. Oil is positioned as a diversifier asset because it continuously made up more than 90% of allocations overall, peaking at 95.88% during COVID-19. Gold's weight of 74.20% over the whole period and its ability to hold steady

during times of crisis demonstrate its value as a reliable diversifier. Given their low volatility and combined benefits, it is advised that investors aiming to access the Omani market maintain sizeable holdings in both gold and oil. For Oman both oil and gold are safe haven on percentiles.

5.2.10 Qatar

Investors should include a large percentage of oil in portfolios centered on Qatar; this percentage remained at 81.85% for the entire period and rose to 93.61% during COVID-19. This demonstrates how effective oil is as a diversifier during unstable times. With a moderate allocation of 54.36%, gold also provides diversification benefits; during the COVID-19 crisis, this percentage increased to 66.09%. For investors in Qatar, a portfolio with significant oil and well-placed gold allocations can provide robust stability and diversification. Oil and gold both acts as safe haven on percentiles for investors of Qatar's market.

5.2.11 Turkey

Turkey's approach suggests a diversified portfolio with a comparatively lesser reliance on oil. Oil received 57.97% of the allocation for the entire period, while stocks had a high allocation of 42.03%, suggesting a balanced approach. With an average of 26.70%, gold allocation was the lowest among nations, indicating a minimal reliance on metal. With less reliance on gold for additional diversification, investors may concentrate on oil as a diversifier also while keeping a significant stock exposure to profit from market expansion. Oil acts as a safe haven for investors of Turkey's market.

5.2.12 United Arab Emirates (UAE)

Investors in the UAE are encouraged to maintain a sizable oil holding as a hedge, with weights continuously over 80% and 90.67% during COVID-19. Gold is a useful instrument for diversification, with steady allocations of about 59.65% overall and a small increase during times of crisis. Investors in the UAE can build a robust

portfolio that fits with the steady market dynamics of the region by giving priority to oil and adding gold as a supplement. Oil and gold both hold the properties of safe haven for investors of UAE's market.

5.3 Study Limitations and Future Research Directions

Despite certain limitations, this study adds valuable insights to the existing literature by offering empirical evidence on the hedging, diversification, and safe-haven roles of gold and oil against Middle Eastern stock markets. It underscores the need to account for regional economic structures and external influences when evaluating the effectiveness of commodities as financial tools. Future research could broaden this analysis to cover other markets and asset classes, examining interactions between gold, oil, bonds, and additional commodities like other precious metals, stock markets, real estate, and foreign exchange rates. Extending the data period could enhance the reliability of the findings. Moreover, analyzing different market groups could provide a more comprehensive understanding of diversification, safe-haven, and hedging capabilities across various asset types.

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