Oil and Gold Return Spillover Effect on The Elasticity of Stock Markets

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ABSTRACT

This dissertation aimed to achieve two primary goals. First, I studied the elasticity spillover effect in the Middle East financial market. Second, I studied the return spillover effect of oil and gold on the elasticity of financial markets in a group of Middle Eastern countries. To achieve these goals, I used the latest method to test the time effect during time variation. For instance, I employed bivariate and partial wavelet tests to visualize the association and the effect during the time domain. The results indicated an interaction between oil-exporting countries, while it is less for importing countries. The Saudi market is also the largest source for determining the elasticity of the Middle East markets. The Jordanian, Turkish, and Kuwaiti markets are the most affected by the elasticity of the region's markets. Finally, the Bahraini market is considered one of the financial markets least influenced by the elasticity of the region's markets. In contrast, the Egyptian and Bahraini markets interact the least with the other financial markets in the Middle East.

Moreover, I found a heterogeneous impact of oil and gold returns on stock market elasticity. In contrast, oil returns significantly affected elasticity in most oil-exporting countries. Additionally, the elasticity of financial markets in oil-importing countries only slightly impacted the movement of oil returns. The impact of oil and gold returns also varied among short, medium, and long-term periods; gold returns were greater for Kuwait, Bahrain, Saudi Arabia, and Jordan. Additionally, the impact of oil was more in Qatar, Bahrain, and Egypt, whereas the effect of gold and oil was equal in Turkey. Lastly, the COVID-19 pandemic significantly affected the elasticity of financial markets.

Keywords: oil prices, gold price, stock market elasticity, COVID-19, wavelet coherence test, partial wavelet coherence test.

ÖZ

Bu tez iki temel amaca ulaşmayı amaçlamıştır. İlk olarak, Orta Doğu finans piyasasındaki esneklik yayılma etkisini inceledim. İkinci olarak, bir grup Ortadoğu ülkesinde petrol ve altının finansal piyasaların esnekliği üzerindeki getirisinin yayılma etkisini inceledim. Bu hedeflere ulaşmak için, zaman değişimi sırasında zaman etkisini test etmek için en son yöntemi kullandım. Örneğin, zaman alanı boyunca ilişkiyi ve etkiyi görselleştirmek için iki değişkenli ve kısmi dalgacık testleri kullandım. Sonuçlar, petrol ihraç eden ülkeler arasında bir etkileşime işaret ederken, ithalatçı ülkeler arasında daha az etkileşim olduğu gösterilmiştir. Suudi pazarı aynı zamanda Orta Doğu pazarlarının esnekliğini belirleyen en büyük kaynaktır. Ek olarak, bölge piyasalarının esnekliğinden en çok Ürdün, Türkiye ve Kuveyt piyasaları etkilenmektedir. Son olarak, Bahreyn piyasası, bölge piyasalarının esnekliğinden en az etkilenen finansal piyasalardan biri olarak kabul edilmektedir. Buna karşılık, Mısır ve Bahreyn piyasaları, Orta Doğu'daki diğer finansal piyasalarla en az etkileşime giriyor.

Ayrıca, petrol ve altın getirilerinin borsa esnekliği üzerinde heterojen bir etkisi buldum. Buna karşılık, petrol getirileri, petrol ihraç eden çoğu ülkedeki esnekliği önemli ölçüde etkiledi. Ek olarak, petrol ithal eden ülkelerdeki finansal piyasaların esnekliği, petrol getirilerinin hareketini çok az etkilemiştir. Petrol ve altın getirilerinin etkisi de kısa, orta ve uzun vadeli dönemler arasında değişmektedir; Altın getirileri Kuveyt, Bahreyn, Suudi Arabistan ve Ürdün için daha fazla olduğu belirtilmiştir. . Ayrıca Katar, Bahreyn ve Mısır'da petrolün etkisi daha fazlayken, Türkiye'de altın ve petrolün etkisi eşittir. Son olarak, COVID-19 salgını finansal piyasaların esnekliğini önemli ölçüde etkilemektedir..

Anahtar Kelimeler: petrol fiyatları, altın fiyatı, borsa esnekliği, COVID-19, dalgacık uyum testi, kısmi dalgacık uyum testi.

DEDICATION

My parents, I would like to thank you from the deepest of my heart, and I dedicate to you the summary of my effort. Without you, I would never be able to go forward, and all the words of this world will not be enough to express how grateful I am to you. May Allah protect you.

My dear wife, Somaiya, you have always helped me in all stages of my study, you encouraged me, and you pushed me to reach what we always dreamed to reach. I will always appreciate what you did to me, and you will always be my lantern on the darkest nights.

Thank you for everything, thank you to be in my life.

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LIST OF SYMBOLS AND ABBREVIATIONS

/	Conditional
BWC	Bivariate Wavelet Coherency
COVID-19	Coronavirus Disease
P	Index Closing Price
PWC	Partial Wavelet Coherency
TEC	Trading Elasticity Coefficient
TV	Trading Volume
WTI	West Texas Intermediate

Chapter 1

INTRODUCTION

1.1 Introduction

Elasticity is essential in neoclassical economic theory because it helps clarify various economic theories, for instance, the incidence of tax rates, marginal principles related to the theory of the firm, income disparity, and different types of commodities related to the theory of consumer preference, and explain welfare distribution. However, this concept is no longer confined only to commodities. However, it is now used to explain the behavior of prices for non-commodities. For instance, elasticity has been used to explain GDP movement and the impact of oil prices on it (Wilson, J. 2021). Therefore, stock markets can also apply this concept, as the choice of share investment is subject to the differentiation between other assets as a substitute option.

Several researchers linked the elasticity of financial markets with liquidity, including Datar (2000), Næs et al. (2011), and Chung et al. (2014), pointing out that high elasticity indicates high liquidity, which results from an increase in the demand for investment in the stock market. However, Ayadi et al. (2022) and Sterenczak et al. (2020) argued for no causal association between market elasticity and market return. Nevertheless, based on the preceding, it can be concluded that market elasticity and liquidity may be two separate or similar concepts, depending on the nature of the market. Therefore, in this dissertation, I focused on studying the elasticity of financial markets as it indicates their quality. Markets with high efficiency, which constitute a

source of attraction for the investor, will be chosen as an alternative to the rest of the investments.

Like commodities, the efficiency of stock markets may be affected by factors such as interest rates, inflation rates or the prices of some commodities, and the returns on other investments. Therefore, the geopolitical changes that the region witnessed and the accompanying rise in energy prices changed the concept of investment priorities so that investors resorted to more conservative investments. Moreover, the corona pandemic, which is still ongoing at present, also affected the choice of investments and the price of crude. Hence, the closures, followed by the uncertainty in the future of the markets, prompted investors to invest in different alternatives from the pre-pandemic stage (Singh, 2020).

The fluctuation of crude prices, from the sharp decline during the pandemic to the significant rise during the Russo-Ukrainian war, has increased uncertainty among investors. For instance, oil futures contracts fell to unprecedented levels. On March 9, 2020, oil prices dropped by more than 25% in a single day. Different causes explain this variation in oil prices. For instance, COVID-19 raised several concerns among investors because of its societal effect (high infection rate, significant death rates, and accompanying health service obstructions).

On the one hand, the global crisis reduced activity worldwide, primarily affecting the transportation sector and, as a result, the oil demand. On the other hand, the failure of early oil supply discussions between the Organization of the Petroleum Exporting Countries (OPEC) and Russia prompted international suppliers to initiate a price war. Therefore, worldwide uncertainty caused oil prices and returns to fluctuate. In contrast, three months after the United States announced an anticipated Russian attack on

Ukraine, crude prices increased by 68.43% ($111.60 on March 22, 2022), culminating at $123.7 per barrel on March 8, 2022, an increase of 86.67% (Del Lo et al., 2022).

The yellow metal was not immune to this uncertainty and effectively played its traditional role as a hedging tool (Ji et al., 2020). Gold is a protective asset among investors facing unpredicted price changes in financial markets and inflation. Increased uncertainty and financial risk worldwide led investors to invest in gold to protect their portfolio returns (Tanin et al., 2022). Increases in demand for gold as a protective asset during COVID-19 raised gold prices. According to Atri et al. (2011, 2021), COVID-19 has positively affected gold prices. Furthermore, gold reached a one-month peak, just below $2,000 per ounce, as fears over the Russia-Ukraine war and growing inflationary pressures boosted safe-haven prices for the valuable metal (CNBC, 2022).

This dissertation is divided into two parts in light of the above discussion. In the first section, I discussed the relationship between the sample markets' flexibility and the existence of a cross-border influence between these financial markets. In the second part, I examined the nexus between gold-oil returns and stock market elasticity in the Middle East oil-importing and -exporting countries. We examined return spillovers among markets, oil-gold returns, and stock market elasticity using Diebold and Yilmaz's (2012) and Barunik and Krehlik's (2018) methods to achieve these goals. We also used bivariate and partial wavelet approaches to visualize the coherence among oil-gold returns and stock market elasticity.

Diebold and Yilmaz's (2012) method allowed us to investigate spillovers among our variables directionally, while Barunik and Krehlik's (2018) method reveals the directional return spillovers among our variables under different investment horizons (short-term, medium-term, and long term). Additionally, we used the wavelet

coherence method to determine the coherency of variables in a time-frequency domain. After determining the possible co-movements among oil-gold returns and stock market elasticity, I applied the partial wavelet coherence (PWC) method to investigate the possible impact of the COVID-19 pandemic on the co-movements of variables. This method has superior properties to the bivariate wavelet coherence (BWC) method as it excludes the impact of a common factor on the co-movements between the two variables.

1.2 The Targeted Markets

We chose the Middle East as our sample because, according to OPEC reports, the Middle East has 64.5% of OPEC's oil reserves (OPEC, 2021). However, the stock markets in these countries are still inefficient, and the demand for stock investments is low compared to other investment alternatives. Therefore, we excluded countries that did not provide sufficient data. For instance, we eliminated Iraq from our sample because it did not provide enough information regarding market capitalization or trading volume. Moreover, we excluded Oman because of its small overall market size. To obtain a geographically homogenous sample, we chose the most oil-importing countries with sufficient data: Jordan, Egypt, and Turkey. We excluded Syria and Lebanon because they lacked data regarding stock markets.

These countries were also chosen because they are located in a close geographical area, which may allow more interaction between them. Moreover, the sample mix between oil-exporting and -importing countries is an opportunity to compare the impact of crude prices on the elasticity of markets according to their different economies (oil or non-oil economies).

1.3 The stock markets

Even after the significant development in the ways of investing in the stock markets and the facilities offered by the markets to investors to choose the most appropriate investment, the Middle East market still suffers from a decline in the demand for stock investments. According to Billmeier & Massa (2007), petroleum products are the primary source of liquidity in the Middle East stock markets. In comparison, oil-importing countries suffer from a severe decline in the volume of investment in the stock market. Moreover, Yu & Hassan (2008) concluded that the most significant influence of the change in the stock market returns in the Middle East is the markets themselves. This was confirmed by Cheng et al. (2010). They concluded that the Turkish market is the most interactive market with global markets. While the rest of the Middle East markets have a local risk that affects their revenues, and their impact on global markets is limited. Chau et al. (2014) linked the decline in stock market returns to political uncertainty. The Arab Spring revolutions led to increased stock market returns volatility. Panda et al. (2019) concluded that stock markets in the Middle East are linked to African stock markets only in the short term.

In the next section, I will detail the stock markets of the sample countries while discussing the change in trade volume as well as market returns and their impact on oil return.

1.3.1 Saudi Arabia

Saudi Arabia has the Middle East's largest GDP. It contributed 30.3% of the region's total in 2019, hitting $793 billion, its greatest amount ever. Despite a fall in value to $700 billion, the country raised its market share of the Middle East's GDP to 31.4% in 2020. Saudi Arabia exited a term of deflation in 2020, with inflation reported at 3.4% due to rising global oil prices, higher grocery bills, and an increase in VAT.

The country's budget statement forecasts 7.2% economic growth in 2022 (Patton, 2022). However, the Saudi stock market has witnessed a significant development in the past three years. According to Reuters (2020), The Saudi stock market witnessed a remarkable increase in the volume of investments, coinciding with the rise in oil prices due to the Ukrainian-Russian crisis. Figure (1) shows the value of market capitalization during 2009 – 2022. The figure depicts the tendency of the Kingdom of Saudi Arabia to diversify the sources of investment to new non-oil sources. The impact of the pandemic and geopolitical tensions in the region was also reflected in the investors' resort to safer alternative investments. Figure 2 shows the behavior of the price of the Saudi stock market index and the oil price. According to the figure, the stock market price is highly affected by the movement of oil prices. However, this phenomenon is not surprising given that Saudi Arabia is one of the largest oil exporters in OPEC.

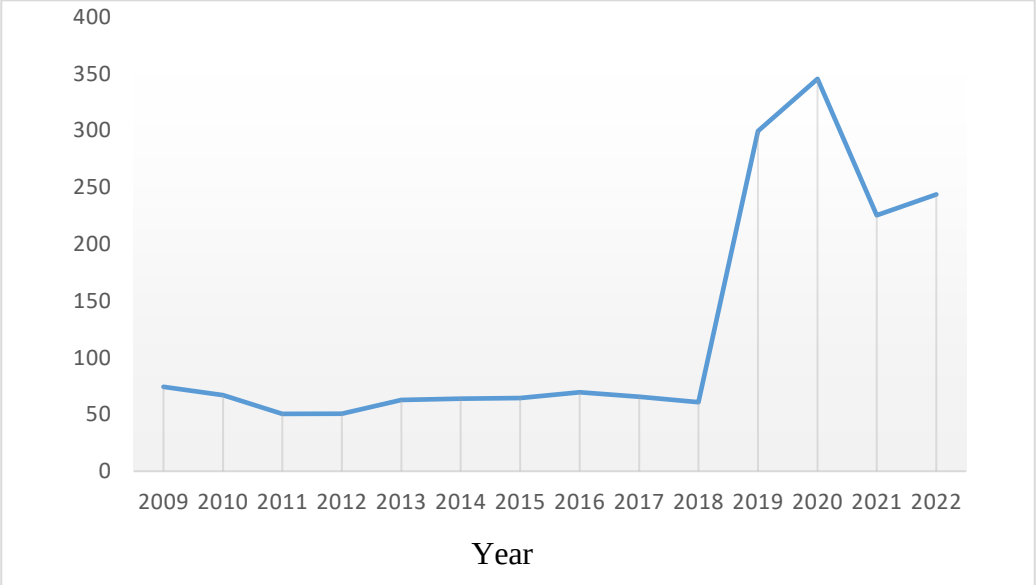

Figure 1: Saudi stock market capitalization as % of GDP between 2009 – 24 July 2022. Data source: Refinitiv DataStream

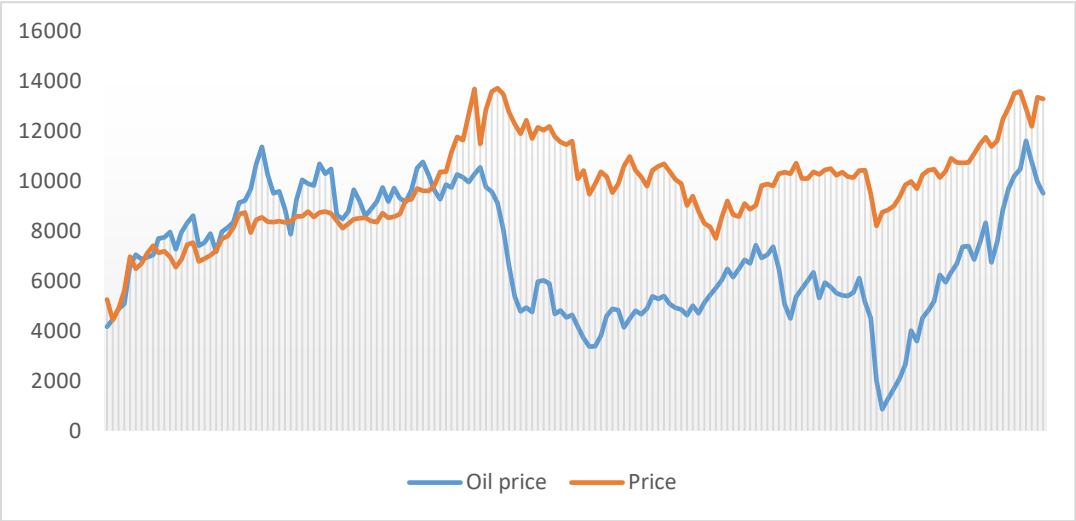

Figure 2: Daily data (2018- 07.2022) for the association between Saudi stock market index and oil prices. Data source: Refinitiv DataStream

1.3.2 Qatar

Among the world's foremost liquefied natural gas suppliers, with the greatest GDP per capita among Middle East countries, Qatar had a GDP per capita in 2019 of $62,276, compared to Saudi Arabia's $23,139. It ranks among the wealthiest countries in the world, with a plethora of oil and gas reserves and a comparatively low population compared to its rivals (Patton, 2022).

The Doha Securities Market (DSM), formally founded in 1995, began operations in 1997. DSM accomplished the enterprises' linking initiative over the internet in three years and became one of the region's top markets. It rapidly expanded from 2002 to 2007 due to the listing of several public and private firms that were turned into shareholder companies.

Figure (3) shows the market capitalization value during 2009 2022 as a % of Qatar's GDP. Unlike that of the Saudi stock market, the share of the Qatari stock market in the total GDP in 2009 was higher than that of its Saudi counterpart. However, later, the Qatari market experienced a contraction to stabilize at 80% of the total GDP.

The interaction between oil prices and Qatari stock index price does not differ much from the case in the Saudi market. Figure 4 shows the impact of oil prices on the Qatari stock index. However, this relationship is expected given Qatar's status as one of the most critical members of OPEC.

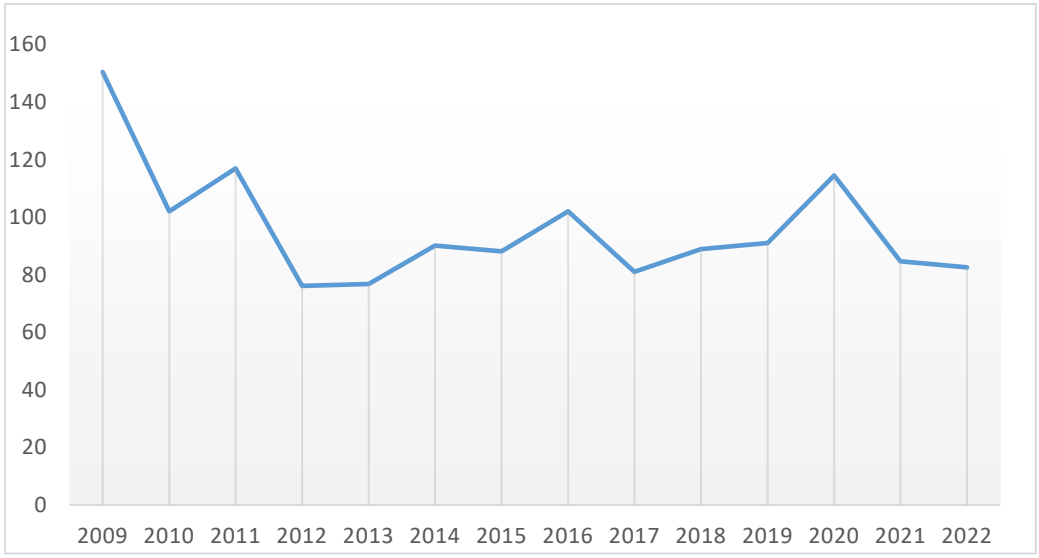

Figure 3: Qatar stock market capitalization as % of gdp between 2009 – 24 July 2022. Data source: Refinitiv DataStream

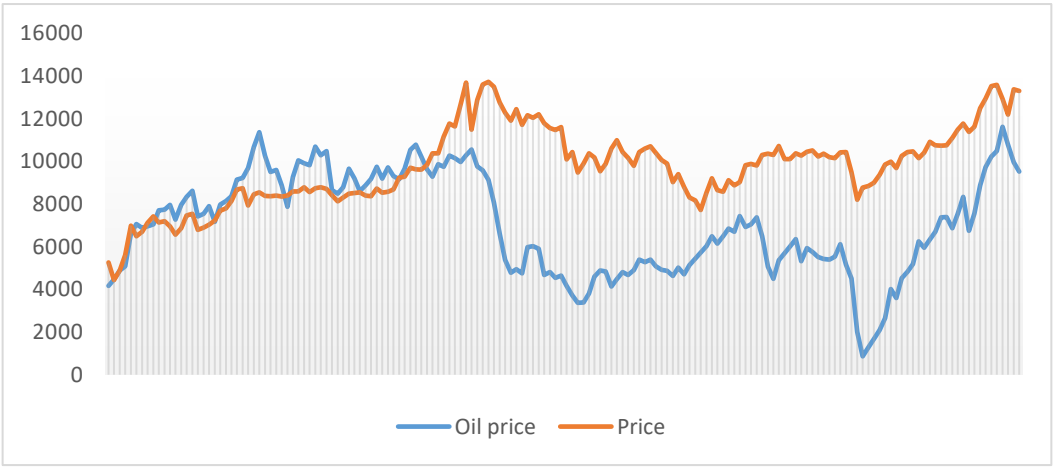

Figure 4: Daily data for the the association between Qatari stock market index and oil prices. Data source: Refinitiv DataStream

1.3.2 United Arab Emiratis (UAE)

The UAE, placed after KSA, contributes considerably to the Middle East's GDP, consistently more than 15.5% since 2015, reaching the maximum in 2020 at 16.1% (Patton, 2022).

According to Padma (2022), the UAE market still needs more supporting regulations and legislation to stimulate the investment movement. Additionally, like the rest of the world's markets, the UAE stock market has been negatively affected by the corona pandemic (ELLIL, 2021). However, the rise in oil prices and improvement in tourism led to the revitalization of various sectors, including the stock market sector (Fasanya et al., 2022; Papadopoulou, 2022).

Figures 5 and 6 show the stock market capitalization and the association between stock market price and oil prices. The UAE is witnessing a remarkable development in the contribution of the stock market to the GDP. Compared to Saudi Arabia and Qatar, the UAE stock market is less affected by oil price fluctuations.

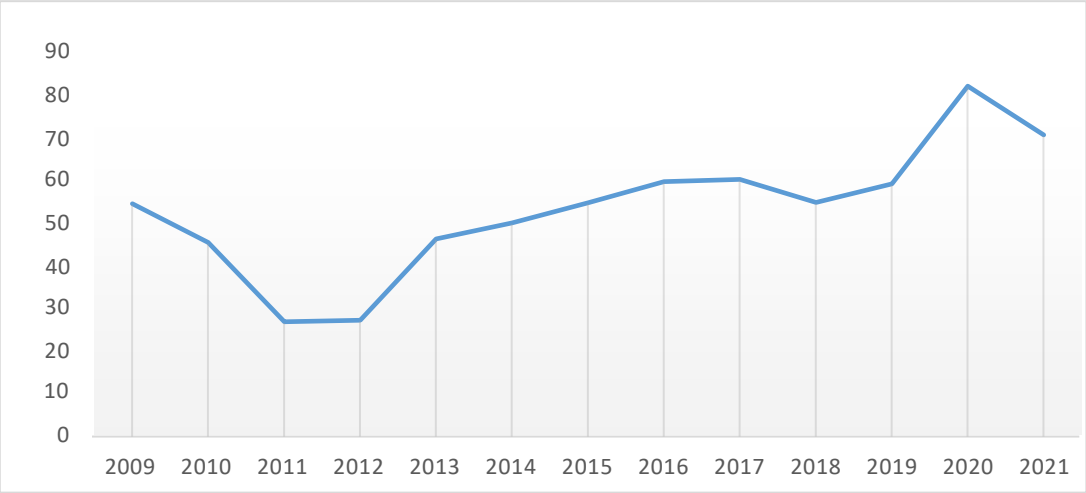

Figure 5: UAE stock market capitalization as % of gdp between 2009 2021.
Data source: Refinitiv Datastream

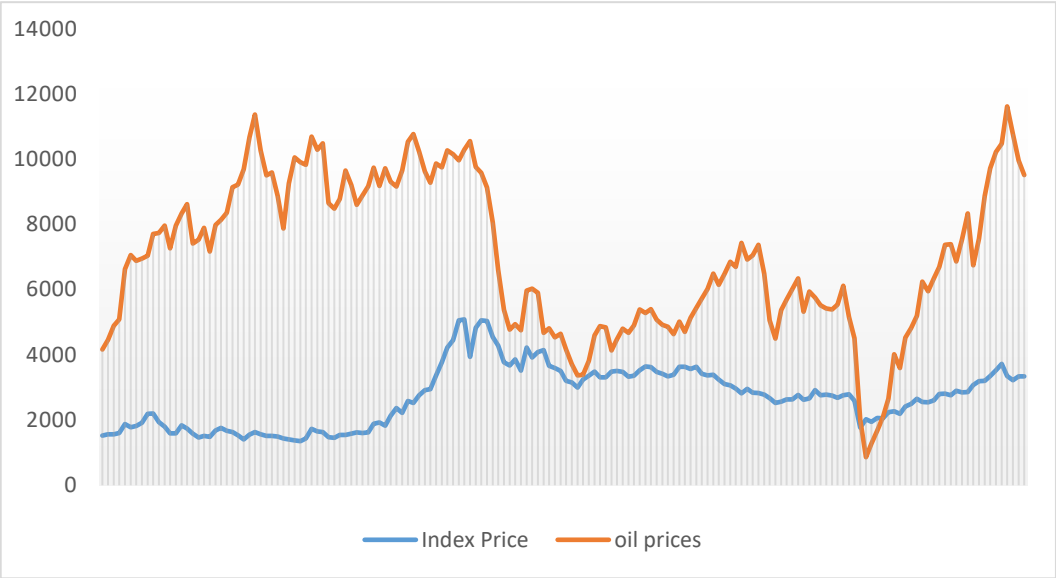

Figure 6: Daily data he association between UAE stock market index and oil prices. Data source: Refinitiv Datastream.

1.3.4 Kuwait

Kuwait is one of the Gulf countries most dependent on oil exports. It is an essential oil producer and OPEC member. Oil accounts for about 50% of Kuwait's GDP, over 95% of exports, and 90% of government international trade earnings. Kuwait has around 7% of the world's oil reserves and a production capability of approximately 3.15 million daily (International Trade Administration, 2022).

Although Kuwait is a small country depending mainly on oil exports, the stock market capitalization exceeded $105,986 million (CNBC, 2022). Figure 7 shows the share of the stock market in Kuwait's GDP during 11 years. Figure 7, show a sharp decrease in the stock market capitalization as % of GDP in 2019, as result of the increase in the gross domestic product.

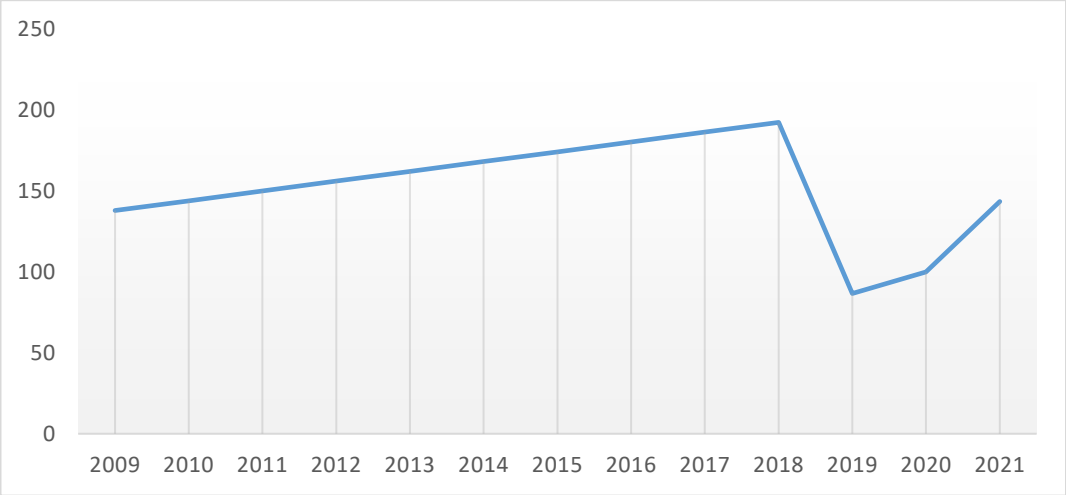

Figure 7: Kuwait stock market capitalization as % of GDP between 2009 – 2021. Data source: Refinitiv DataStream

1.3.5 Jordan

Exogenous shocks have hampered Jordan's economic growth for over ten years: beginning with the 2008 Global Financial Crisis, accompanied by the Arab Spring in 2011, which disrupted oil supplies, and the 2015 closings of Jordan's boundary with Iraq (reopened in August 2017 but still not booming) and Syria (slightly reopened in 2018), ending with an increasing number of Syrian refugees. During this time, the government had substantial yearly budget deficits. However, they tried to fill this gap through loans, external aid, and savings from economic reform initiatives implemented under the International Monetary Fund (IMF) Extended Plan Facility arrangement.

Amman Stock Exchange (ASE) was founded in March 1999 as a private, non-profit organization with fiscal and administrative independence. It is permitted to operate as a stock exchange to organize securities transactions. However, in 2007, market management and regulation began to shift under the umbrella of the public sector in the hands of the Jordanian government (Wikipedia, 2022).

Since Jordan entirely depends on energy imports, the oil price shocks have greatly affected the stock market (Ali et al., 2018). Moreover, like others, the Jordanian stock market has been affected by the closures imposed by the Jordanian government

to prevent the spread of the pandemic (He et al., 2020). Figure 8 shows the ratio of Jordanian stock market capitalization to total GDP. The figure shows a significant decrease in the Jordanian stock market's share of the GDP, as the slope curve heads downward sharply.

Figure 9 presents the association between oil prices and the price of the stock index for the Jordan stock market. Given that Jordan's an oil importer, the relationship is somewhat weak, but it does exist based on figure 9. It also clearly shows the pandemic's impact on the Jordanian stock market.

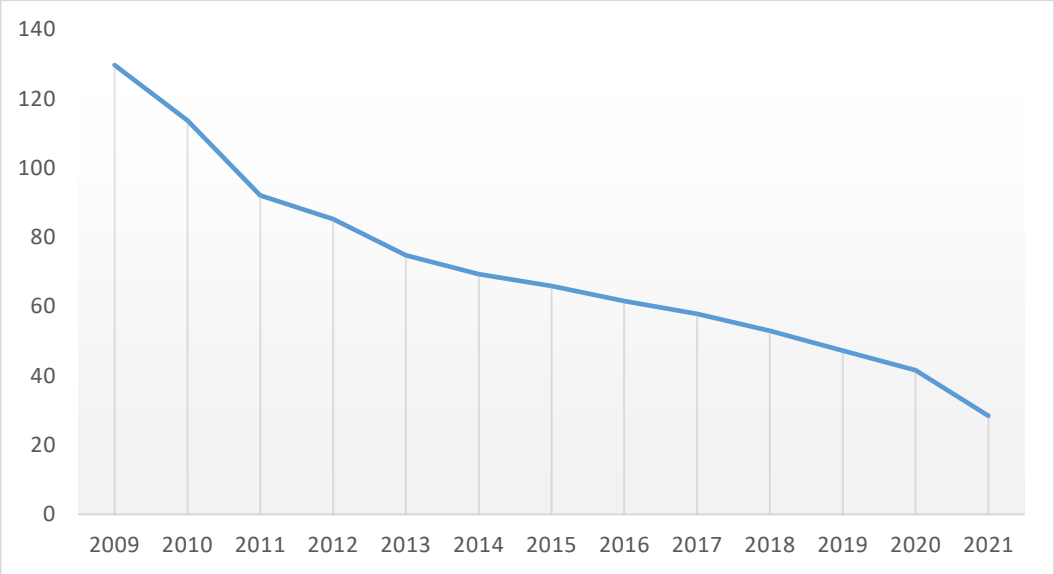

Figure 8: Jordan stock market capitalization as % of GDP between 2009 – 2021. Data source: Refinitiv DataStream

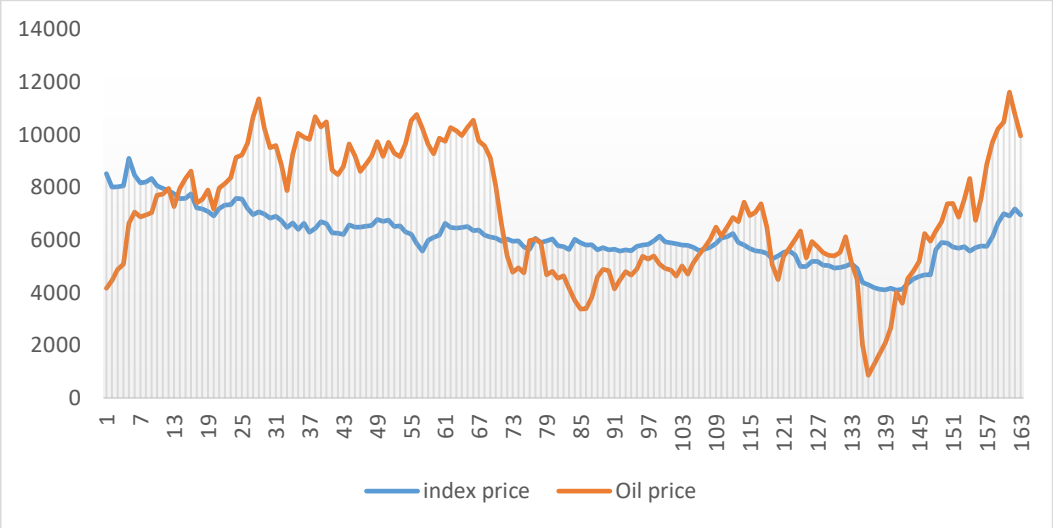

Figure 9: Daily association between Jordanian stock market index and oil prices. Data source: Refinitiv DataStream

1.3.6 Bahrain

Bahrain's economy mainly depends on oil and gas exports, as total oil exports constitute 25% of Bahrain's GDP (International Monetary Fund, 2016). The Bahraini economy increased by 2.2% in 2021, with a 2.8% rise in non-hydrocarbon GDP and a 0.3% decrease in oil-exporting GDP. The improvement was aided by good performance in non-oil manufacturing and retail trading in addition to hotel sectors (IMF, 2020).

The Bahrain stock exchange was founded in 1987, and formally commenced activities on June 17, 1989, with 29 shareholder companies. It functioned as an independent state overseen by an autonomous Board of Directors led by the President of Bahrain's Central Bank (Bahrain Stock market, 2022). Figure 10 presents the contribution of the Bahraini stock market to the Bahraini GDP. We note from the figure that the Bahraini stock market has maintained a specific contribution level to the GDP, and despite fluctuations in the capital value, there has been improvement in stock market over the years. Figure 11 shows the association between the Bahrain price of market index and oil prices. The curve shows that the Bahraini market is less

affected by oil prices than the other Gulf markets are (e.g., Saudi Arabia, the Emirates, Kuwait, and Qatar), which indicates the kingdom's tendency to diversify its trade dependencies.

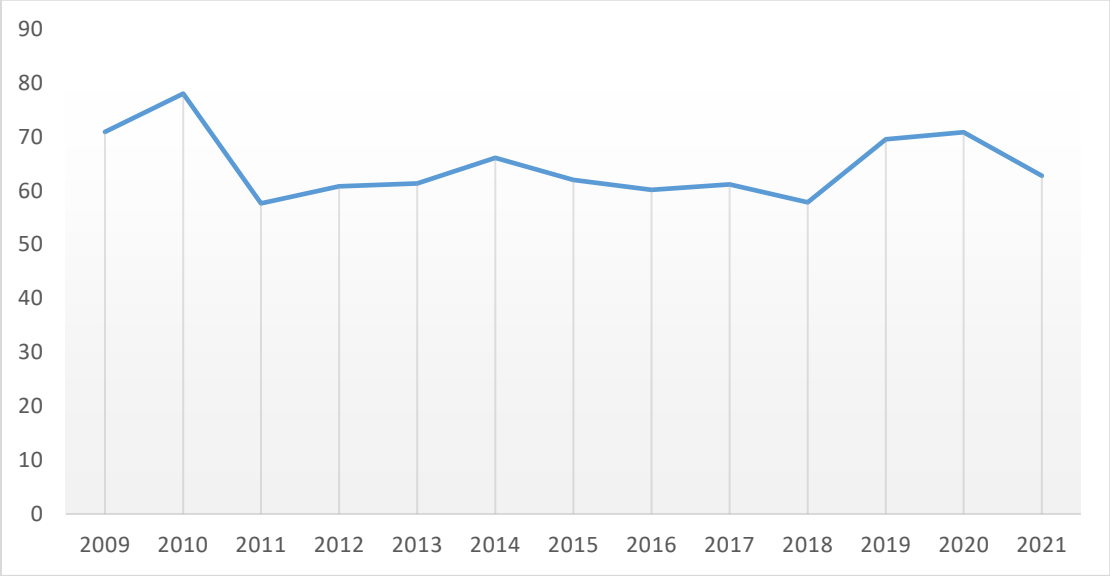

Figure 10: Bahrani market capitalization of listed domestic companies (% of GDP). Data source: Refinitiv DataStream

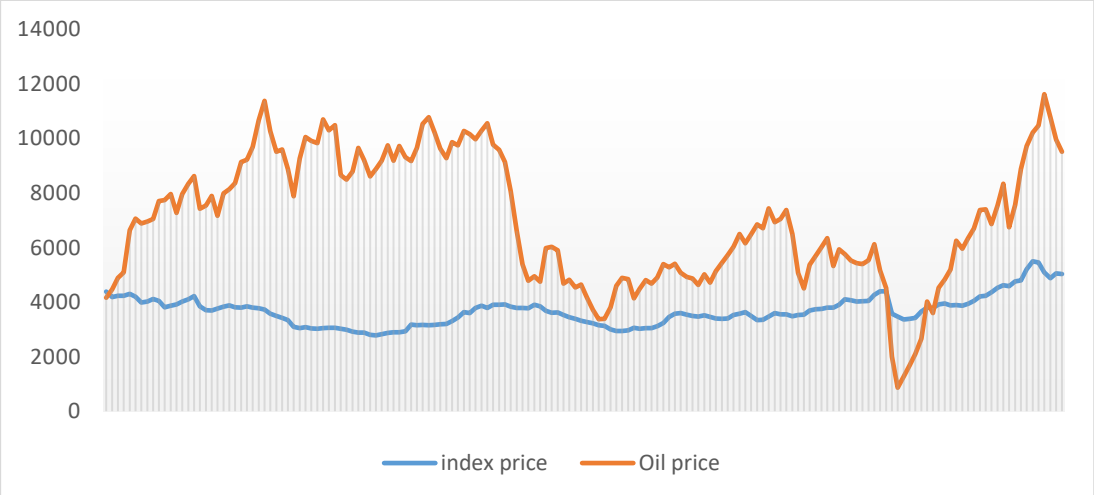

Figure 11: Daily association between Bahrain price of market index and oil prices between January 2, 2018 to July 24, 2022. Data source: Refinitiv DataStream.

1.3.7 Egypt

Egypt is one of the oil-importing countries, and its economy ranks 121st globally (Reuters, 2021). The Egyptian economy has also witnessed many regional and local challenges, such as the Arab Spring revolutions and the ongoing Libyan crisis. According to IMF (2022), the Egyptian economy grew through the first quarter of 2022 by 5.3%.

Like other financial markets, the Egyptian market was affected by the pandemic and the subsequent rise in oil prices. However, according to Gourène and Mendy (2018), the impact of the Egyptian market on oil prices is slight. On the other hand, the Egyptian market was greatly affected by the corona pandemic, which decreased its performance (Elsayed and Abdelrhim, 2020). Figure 12 presents the contribution of the stock market to the total GDP. According to the figure, the contribution rate decreases in time and reaches the lowest in 2021.

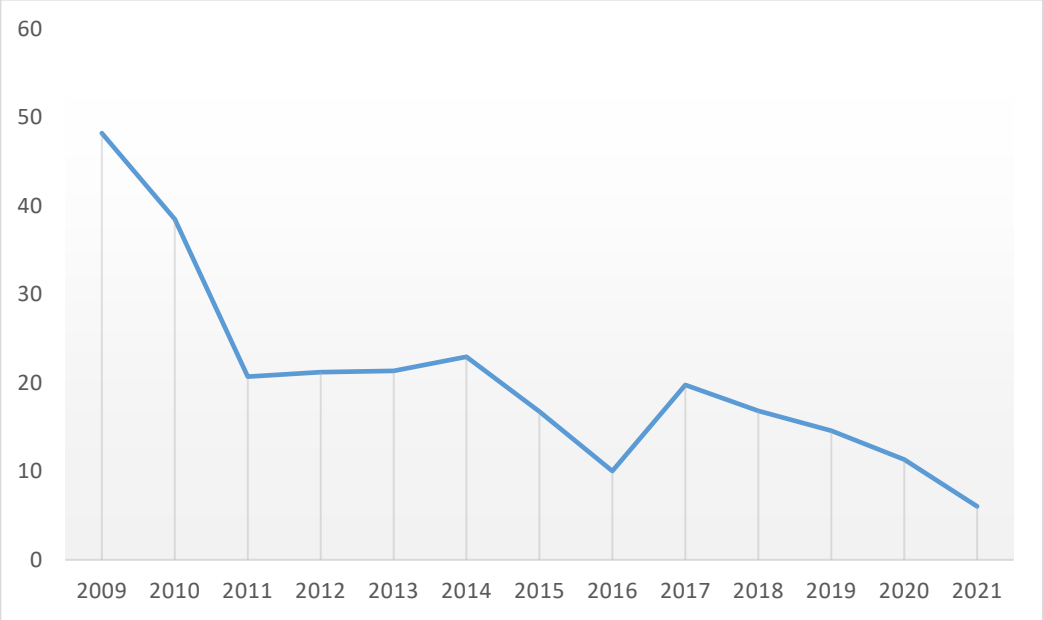

Figure 12: Egyptian market capitalization of listed domestic companies (% of GDP). Data source: Refinitiv DataStream

1.3.8 Turkey

The Turkish economy increased at the highest rate among the G20 countries in 2021, as (COVID-19) procedures and regulations were gradually lifted in Turkey and elsewhere (World Bank, 2022). However, although Turkey's September interest rate cuts boosted the investment rate, they also exacerbated macro-financial volatility, which, paired with externalities from the Ukraine-Russia conflict, will reduce 2022 development to 1.4% (World Bank, 2022).

According to Tursoy and Faisal (2018), short- and long-term results reveal a negative association between the yellow metal price and stock prices and a direct relationship between the crude and stock prices. Toparlı et al. (2019) concluded that the stock market returns are more affected by interest rates and the exchange rate than by oil prices. Figure 13 shows the percentage of the stock market contribution to Turkish GDP, which fluctuates around 25%. Figure 14 presents the monthly relationship between oil price and stock market index price. The figure reveals slight convergence in the time series behavior, which is in line with the fact that the Turkish economy depends on oil imports.

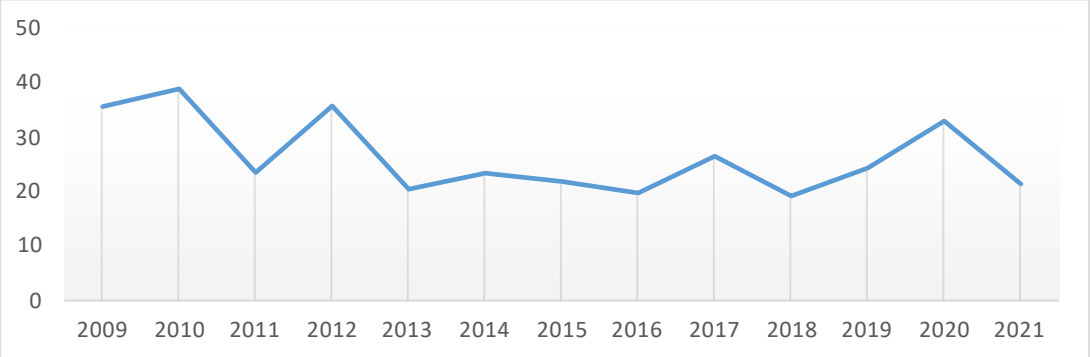

Figure 13: Turkish market capitalization of listed domestic companies (% of GDP). Data source: Refinitiv DataStream

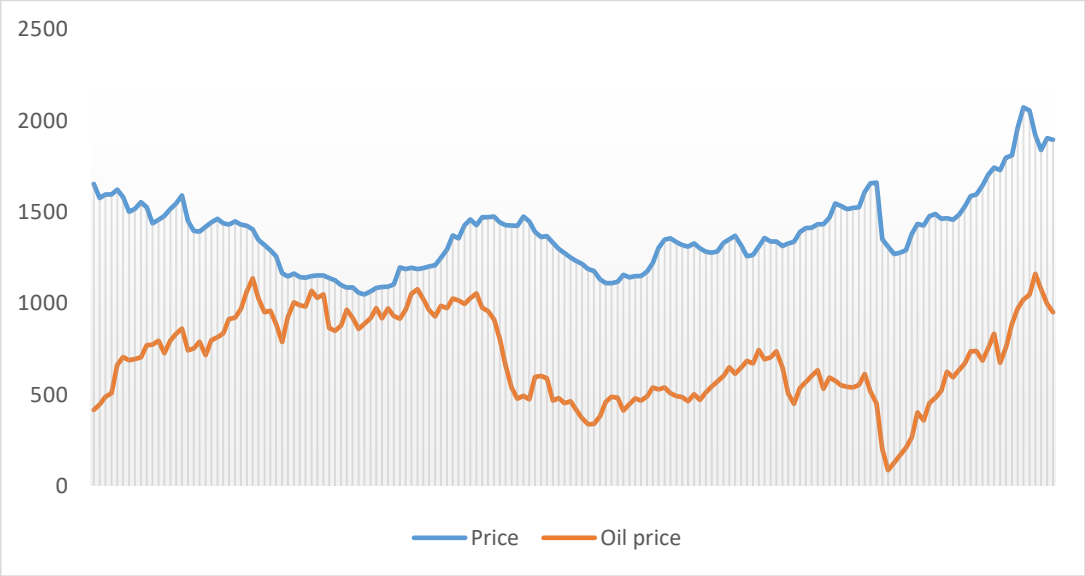

Figure 14: Daily association between Turkish index price and oil prices. Data source: Refinitiv DataStream

1.4 Problem Statement and Importance of Dissertation

Despite the economic progress in the economies of the Middle East, its financial markets are still less developed compared to other countries in the world. Therefore, many researchers (Tiwari et al., 2022; Chang et al., 2021; Neukirchen et al.,2022) have resorted to explaining this by linking it to the efficiency of these markets. Furthermore, recent geopolitical developments include the rapprochement and normalization of relations between Ankara and the Arab countries. On the other side, the political crisis in Europe between Russia and Ukraine and the repercussions of this crisis on oil and gold prices caused an unprecedented state of uncertainty in stock markets. Lastly, the corona pandemic continues to cast shadows across the world. All of this has increased uncertainty about what the future holds. Therefore, many investors transferred their liquid assets to safer long-term investments in light of the pandemic (Li et al., 2021). Hence, investors incurred significant losses in a short time because of the rapid and unexpected spread of the virus, which decreased the general liquidity of the market (Zhang et al., 2020). Furthermore, changes in the general liquidity of stock markets

changed the stock market's elasticity, with investors increasing their trading volumes because of price changes to hedge against probable losses in the stock markets.

In light of the above discussion, this dissertation aims to examine the nexus between gold-oil returns and stock market elasticity in oil-importing and -exporting countries in the Middle East. We examined return spillovers among oil-gold returns and stock market elasticity using Diebold and Yilmaz's (2012) and Barunik and Krehlik's (2018) methods. We also investigated the coherence between oil-gold returns and stock market elasticity by adopting the bivariate and partial wavelet approaches. Diebold and Yilmaz's (2012) method allowed us to investigate return spillovers among our variables in a directional way, and Barunik and Krehlik's (2018) novel method allowed us to investigate directional return spillovers among our variables under different investment horizons (short, medium, and long terms). These methods helped us observe directional return spillovers among oil-gold returns and stock market elasticity and compare their behaviors under different investment horizons. Additionally, we used the wavelet coherence method to determine and visualize coherence among our variables in a time-frequency domain. After determining the possible co-movements among oil-gold returns and stock market elasticity, we applied the partial wavelet coherence (PWC) method to investigate the possible impact of the (COVID-19) pandemic on these co-movements. The advantage of adopting the PWC method is that it excludes the impact of a common factor on the co-movements between two variables. That is why this method has superior properties compared to the bivariate wavelet coherence (BWC) method.

We chose the Middle East as our sample because, according to OPEC reports, the Middle East has 64.5% of OPEC's oil reserves (OPEC, 2021). However, the stock markets in these countries are still inefficient, and the demand for stock investments is

low compared to that for other investment alternatives. We excluded countries with insufficient data. For instance, we excluded Iraq from our sample because it did not provide enough information regarding market capitalization or trading volume. Moreover, we excluded Oman because its overall market size is small. To obtain a geographically homogenous sample, we chose the most oil-importing countries with sufficient data, i.e., Jordan, Egypt, and Turkey. We excluded Syria and Lebanon because they lacked stock market data.

This dissertation contributes to the literature in the following ways: (1) Most previous studies in the literature investigated the effect of volatility in gold and oil returns on the closing prices or liquidity of stock markets, which they measured by turnover ratio. We examined co-movements and correlations between oil and gold return spillover, on the one hand, and stock market elasticity, on the other. (2) We, to our best knowledge, compared co-movements among oil-gold returns and stock market elasticity and the impact of the COVID-19 pandemic on these co-movements for the first time in the literature among homogenous geographical countries in the Middle East, depending on whether the country exported or imported oil. (3) And we employed the latest econometrics approaches to compare empirical results for robustness.

1.5 Dissertation Hypothesis and Questions

In an attempt to explain the aforementioned problem, we have tried to answer the following questions:

- Does the elasticity of the financial markets in the Middle East interact with each other?
- Is there a return spillover effect from gold and oil on the elasticity of a stock market?

- Does COVID-19 affect the strength of the return spillover effect between oil and gold return and stock market elasticity?

Based on the study questions, the following null hypotheses were developed:

H_{01}: There is no spillover effect among Middle East countries.

H_{02}: The impact of gold and oil return does not differ between oil-exporting and importing countries.

H_{03}: The pandemic has no impact on the relationship of gold and oil with the exponential markets.

1.6 Dissertation Structuring

The rest of this dissertation will be as follows: Chapter 2 will review the previous literature that discussed the topic. It will also explain how this dissertation is distinguished from the rest of the literature. Chapter 3 will detail the dissertation variables and the used methodology. Chapter 4 will include the test results and discuss the hypothesis testing results. Chapter 5 will introduce the conclusions and discuss the suggestion and recommendations.

Chapter 2

LITERATURE REVIEW

2.1 Introduction

For decades, researchers Hamilton (1983) and Sadorsky (1999) have tried to study the relationship between oil prices and financial markets, and they concluded that oil has a significant impact on financial markets. However, this relationship is affected by economic and political factors for countries, as it may differ according to the geographical location and whether the country is an exporter or importer of oil.

In this chapter, we will discuss the previous literature that discussed the topic. I have divided it into three sub-headings: First, studies that discuss the interaction of Middle Eastern markets with each other. Second is the impact of oil on the stock market. Third, I will discuss the impact of gold prices on the financial indicators of the Middle East. Fourth: The impact of the Corona pandemic on stock indices and its role in changing the relationship between variables.

2.2 The Return Spillover Effect Among Middle East Countries

Since there are many common factors among the Middle East countries, there is a possibility that the financial markets will be affected by each other. Therefore, the researchers tried to study this relationship. For instance, Rao (2008) used GARCH to investigate the volatility among Middle East equity indices. The results showed a shock transmission between the Middle East markets that does not fade away in the short run. Abou-Zaid (2011) investigated the effect of volatility spillover among MENA countries using the GARCH method. Their principal findings stated a weak

transmission effect between Egypt and Turkey. Finally, Bouri and Yahchouchi (2014) studied the fluctuation of the return transmission between Middle East financial markets. The results concluded that the indirect fluctuation of the return is transmitted between the sample markets and that the Gulf countries are the most interdependent among the sample countries.

Moreover, the effect is not limited to a specific period but includes short, medium, and long term. Balli et al. (2015) investigated the return spillover between the European stock market and the middle east market. They concluded that there is a spillover effect among middle east countries, while the most significant shocks are from the US market. Balli et al. (2015) used AR-GARCH models to test the volatility spillover between developed and MENA financial markets. Their findings indicate that shock spillovers from main developed markets have a diverse impact on developing markets and that the scale of the shocks varies greatly among MENA countries.

Elsayed, & Helmi, and Smales (2021) discussed the role of geopolitical risk in increasing the volatility spillover among the Middle East and North African countries (MENA) using the ADCC-GARCH model. They pointed out that geopolitical factors stimulate the transmission of shocks between the countries of the Middle East and that the most significant volatility spillover is between the Arab Gulf countries. Habibi and Mohammadi (2022) test the volatility spillover between western and MENA countries using Diebold and Yilmaz (2012). They conclude that UAE and Saudi are highly integrated with the US market. Mensi et al. (2021) tested the connectedness among MENA using the wavelet coherency approach and Baruník and Křehlík (2018). They concluded that Saudi Arabia, UAE, and Qatar are MENA's leading exporters of volatility. Panda et al. (2019) used vector auto-regression, a vector error correction model, to test the volatility spillover between African and Middle East Stock markets.

They concluded that the correlation between the sample markets is heterogeneous, and the shocks that affect South Africa also affect Jordan markets. Tien and Hung (2022) used a vector autoregressive moving average to test the volatility spillover among Gulf countries. They concluded that negative oil shocks are transmitted between the Gulf markets more quickly than positive ones, and there is a correlation in the impact of the shock on the markets.

2.3 Gold and Oil Return Spillover Effect

In the last few years, researchers have continually investigated the interaction between the stock market and oil prices. For instance, Kang et al. (2017) studied the dynamic effect between crude oil and precious metals using DECO-GARCH. They found that the crises it is exposed to stimulate further interdependence and the transmission of the shock between gold and oil.

Furthermore, Mohanty et al. (2011) and Hamdi et al. (2019) studied the oil price spillover among GCC countries. They concluded that oil price has a long-term effect on the elasticity of the Qatari stock market. Similarly, Pandey and Vipul (2018) studied the transmission of shocks between gold, oil, and financial markets in the BRICS countries using the GARCH models. They concluded that the fluctuations between oil and gold prices and the financial markets became more remarkable after the financial crisis in 2008, where investors turned to gold more as a safe investment alternative than investing in the stock and bond market.

In recent years, researchers' interest has increased in studying the relationship between financial markets and both gold and oil and ensuring the role of gold as a safe way to hedge. Therefore, Shabbir et al. (2020) used the autoregressive distributed lag model (ARDL) to test the impact of gold, oil prices, and the exchange rate on the stock market. They concluded that oil and gold prices affected stock prices. Further, they

stressed the need to invest in gold in the light of the world's current high inflation rates. Other researchers used a quantile regression approach to examine the relationship between oil and gold prices and an emerging market's stock market volatility (Ali et al., 2020). Their results suggest that exchange rate and gold price volatility negatively affect stock market performance. Civcir and Akkoc (2021) used the nonlinear ARDL (NARDL) method to test the relationship between oil return volatility and the stock market. They found that the effect of oil return shocks is limited in the short term, whereas its effect is feeble in the long term. Finally, using the wavelet approach, Rafiuddin et al. (2021) investigated the relationship among gold, oil, and stock markets for gulf countries stock markets. They concluded that fluctuations in oil and gold returns have no long-term impact on the Gulf countries' stock markets. They also concluded that oil returns affected the Kuwait stock market more than the Gulf markets. Mishra et al. (2022) used the asymmetric causality test to estimate the movement between spot and future prices of oil and gold. The results showed negative and positive shocks in oil prices Granger cause gold prices, and vice versa. Likewise, Kumar et al. (2020) used the NARDL to examine the causality between oil, gold, exchange rate, and stock market return. They concluded that oil affects the Indian stock market, whereas the stock market affects gold.

Dai and Zhang (2022) used DCC-GARCH-model to study the dynamics of financial portfolios and the extent of the volatility transmission between the Chinese stock markets and oil and gold. They concluded that gold and oil could be a safe hedge against uncertainty in Chinese stock markets. In the same way, Mensi et al. (2021) used Diebold and Yilmaz (2012) to study the discrepancy in the impact of oil and gold prices on the Chinese stock market. They concluded that the gold and oil prices fluctuation affects the industrial sector and consumer services. Moreover, Mensi et al.

(2021) studied the impact of the transmission of shocks between the oil and gas markets and the equity markets in the MENA using Conditional Value at Risk. They concluded that oil has a long and medium-term impact on all financial markets in the Middle East and North Africa.

2.4 The Impact of the COVID-19 Pandemic on the Financial Markets

After the emergence of the coronavirus pandemic and the changes it caused in the financial market, the need to study the consequences of this unusual event on the financial market became apparent to researchers. He et al. (2020) studied the impact of the Corona pandemic on stock prices in different sectors using an event study. They concluded that there is a disparity in the impact of the pandemic on different sectors. For illustration, the industry, transportation, and exploration sectors negatively affected them. On the other hand, the technology and telecommunications sectors witnessed growth.

Albulescu et al. (2021) used a wavelet coherence test to examine changes in the correlation between crude oil and the US stock market in light of the COVID-19 outbreak. Their main finding was that the pandemic boosted the spread of oil shocks in the stock market. Wei et al. (2021) found that the pandemic significantly affected the long-run volatility of the correlation between gold and oil market prices. Later, Ali et al. (2022) used the wavelet coherency method to compare spillover and nonlinear causality between oil shocks and stock market volatility. Their findings revealed that the pandemic caused a change in relations in some markets (e.g., Russia) and amplified shocks in other oil-importing markets (e.g., the United States). Finally, Haroon and Rizvi (2020) and Zaremba et al. (2021) used panel regression to test the impact of COVID-19 on market liquidity, which proxied with the turnover ratio. Their findings

showed that increased confirmed cases lead to financial liquidity drying up in the markets.

Moreover, the pandemic has raised questions among researchers about the effectiveness of gold in hedging against risks. Wang et al. (2021) used the multistage approach (e.g., wavelet coherence and GARCH-EVT-VaR model) to investigate the nonlinear oil-gold connection, concluding that gold is still a haven against stock market volatility. Tissaoui et al. (2021) used the wavelet coherency approach to examine the effect of COVID-19 on the liquidity of the Saudi stock market. They concluded that the direction of the relationship between oil return and stock market liquidity varies during the pandemic outbreak. Finally, Chang et al. (2021) studied the impact of the pandemic and government procedures in controlling it and its impact on the Chinese stock market. They concluded that despite the decline in stock performance, the efficacy and effectiveness of the procedures followed by the government in maintaining the value of the stock market. Huang and Wu (2021) studied the relationship between gold and oil and whether gold is considered a haven in light of the Corona pandemic. To achieve the aim of the study, they used VAR(p)-BEKK-ARCH. The study concluded that the pandemic had increased the association between gold on oil markets to the extent that gold is no longer a safe alternative to investment.

Nevertheless, the results also indicated the pandemic's impact on oil more than on gold. Atri et al. (2021) showed that COVID-19 fatalities and fear had a detrimental impact on the price of crude oil. Moreover, the long-term media campaign has a negative detrimental influence on the price of oil. On the other hand, COVID-19 new cases, fatalities, and media favorably impact the price of gold. Mazur et al. (2021) studied the S&P500 profitability during COVID-19 using an event study. They

concluded that some sectors were positively affected by COVID-19 (e.g., healthcare and Natural gas), while others were negatively affected (e.g., hospitality and Petroleum). Finally, Chowdhury et al. (2022) used a vector error correction model to examine the impact of COVID-19 on the stock market return and performance. They concluded that COVID-19 has a negative impact on cumulative return. Furthermore, they found that the S&P 400 is the market most affected by COVID-19.

Based on the preceding, previous studies examined the impact of oil and gold on stock markets and their returns. It also compared the impact of the pandemic on stock returns. In this dissertation, I will focus first on the elasticity of financial markets. Secondly, I will try to fill the gap in the previous literature on the interpretation of uncertainty in the elasticity of oil prices, gold, and financial markets. Finally, I will explain the disparity in the impact of the pandemic between oil-exporting and importing countries located in the same geographical area.

Chapter 3

DATA AND METHODOLOGY

3.1 The Sample and Data Collection

Daily data were collected for the period between January 2, 2018, to July 24, 2022, for a selected sample of eight countries in the Middle East, five of which are oil exporters (Bahrain, United Arab Emirates [UAE], Kuwait, Qatar, and Saudi Arabia) and three are importers (Jordan, Egypt, and Turkey). We chose this sample for two main reasons: first, to compare significant oil-exporting and importing countries in the same geographical area where there may be homogeneity in general political and economic conditions. Second, because we relied on published data about the financial markets of these countries, we excluded countries whose financial markets did not provide sufficient data to calculate the variables. Daily data were collected from January 2020 to November 2021. We chose this period to include the beginning of the pandemic's outbreak and the economic breakthrough until the last SARS-COVID mutation. Information on the epidemiological situation of countries was collected through the (World Health Organization) WHO. In addition, we depended on the Thomson Reuters DataStream to gather information about other variables. Table 1 expressed the variables in detailed.

Table 1: Variables, their abbreviations, and sources

Short name	**Long name**	**Source**
Elasticity	Coefficient of trading elasticity	Calculated
Oil	Daily return of future contract of WTI cured oil (dollar/ barrel)	DataStream
Gold	Daily return of future gold contract (dollar/oz)	DataStream
COVID	Logarithm of cumulative COVID-19 confirmed cases	WHO

3.2 Elasticity

The elasticity of the stock market refers to the sensitivity of the trading volume to changes in stock price. In other words, elasticity measures the receptivity of demand for a particular stock market to price changes. I followed Wanzala (2018) and used the model Datar (2000) proposed to calculate elasticity. According to this model, the trading elasticity coefficient (TEC) is the percentage change in trading volume

$$TEC = \frac{\%\Delta TV}{\%\Delta P}; \quad TEC = (-\infty, \infty) \tag{1}$$

$$\%\Delta TV_t = \frac{(TV_t - TV_{t-1})}{T.V_{t-1}} \tag{2}$$

$$\%\Delta P_t = \frac{P_t - P_{t-1}}{P_{t-1}} \tag{3}$$

($\%\Delta TV$) to percentage change in price at time t ($\%\Delta P$), with a wide range of possible values, from minus infinity to positive infinity (-∞, ∞):

A high TEC means a large volume of transactions follows price movements. When significant transactions occur with minimal price movement, the value of TEC approaches infinity and, therefore, high elasticity. For instance, if TEC is more than one and prices are rising, it shows that greater prices attract more volumes, which is good news. However, if TEC is one and prices rise, trading volume will rise simultaneously. If TEC is less than one and prices are rising, they are rising on a low

level of demand. This rise may be speculative, and the market may be considered to be inelastic. Based on the elasticity factor, investment in the stock market can be roughly classified as inferior or normal. Normal stock marts have a positive elasticity factor, which means that when liquidity increases, more investments are sought at each price level. Typical stock markets with elasticity factors between zero and one are considered desired investments, which are investments that investors will select despite variations in stock market price. In inferior stock markets, the elasticity factor is negative; as the stock price decrease, the demand for investing in the stock market does not change (Ng & Shen, 2020). Several factors might convert investing in the stock market from a desired to an unfavorable investment, such as stock return, uncertainty, and other risks that may make other investment options more profitable (Schroff et al., 2016; Haddad et al., 2021). In highly elastic stock markets, trade volume varies fast as prices vary, but in inelastic stock markets, the same quantity is required even as prices change. Therefore, a positive elasticity number indicates that the stock market is elastic. However, the negative numbers indicate that investing in stock markets is unwise. The TEC less than one and more than minus one indicates that stock market investment is inelastic and therefore has low liquidity. Table 2 summarizes the interpretation of the stock market elasticity factor.

Table 2: The interpretation of elasticity factor

Negative TEC (low liquidity in stock market)			
TV	P	Elasticity factor	Elastic or Inelastic
Decrease/ increase	Increase/ decrease	$-1 < TEC < 0$	Inelastic
decrease/ Increase	Increase/ decrease	$-1 > TEC$	Elastic
Positive TEC (low liquidity in stock market)			
Decrease/ increase	Increase/ decrease	$0 < TEC < 1$	Inelastic
Decrease/ increase	Increase/ decrease	$TEC > 1$	Elastic

3.3 Model Specification

The main goal of this study is to test the co-movements between stock market elasticity and oil and gold returns. Therefore, we started by testing the following models:

$$TEC_{country} = f(Oil, Gold) \quad (4)$$

$$TEC_{country} = f(Oil, Gold|COVID) \quad (5)$$

The first model assumes that oil and gold returns drive TEC, whereas the second model tests this relationship after adjusting for the impact of COVID-19. We reviewed the literature (Adekoya et al., 2021; Asadi et al., 2022; Umar et al., 2019) to choose the methodology that could best achieve the main goals of this study. We adopted Diebold and Yilmaz's (2012) and Barunik and Krehlik's (2018) frequency domain spillover methods, and we reposted the results by visualizing them using wavelet coherence. Finally, we used PWC to exclude the effect of COVID-19 on the relationship between variables.

3.3.1 Diebold and Yilmaz (2012)

The fundamental goal of this research was to provide additional information on the oscillations in the returns of oil and gold and their impact on the oscillations of stock market elasticity for a sample of Middle Eastern oil-importing and oil-exporting countries. We used Diebold and Yilmaz's (2012) technique to achieve this goal. This technique is based on the VAR system and generalized variance decomposition (GVD) and offers a simple and straightforward way to measure the system's volatility connectedness. GVD aims to separate the forecast error variance of one asset from parts other assets have affected. GVD helps overcome any disturbance induced, which is attributed to ordering other variables. In the middle of the GVD version, the past distribution of errors is utilized, creating the correlated shocks (Diebold & Yilmaz, 2012).

Additionally, the GVD is efficacious in curbing the connectedness among financial assets. As a result, the GVD model aids in eliminating any disruption caused by ordering other variables. The previous distribution of mistakes is used in the middle of the GVD version, causing the associated shocks (Diebold & Yilmaz, 2012). The GVD effectively reduces the degree of interconnectedness between financial assets. The following equation can formulate the nth order for VAR model:

$$\pi_t = \sum_{n=1}^{i} \sigma_n l_{t-n} + \varepsilon_t \tag{6}$$

Where π_t is a (π_1, π_2, π_3) random vector, ε_t is a vector of error terms, and σ_n is the function of a 3 × 3 matrix. After we assumed that the var system was covariance stationary, we represented the moving average representation in the following equation:

$$\pi_t = \sum_{i=1}^{\infty} A_j \varepsilon_{t-n}, \qquad A_j = \sum \sigma_n A_{n-1} \tag{7}$$

A_0 is the N × N identity matrix, and A_n is equivalent to zero. The moving average was based on the GVD model and was used to assess overall spillover, paired spillover, and directional spillover among stock market elasticity, oil return, and gold return. The GVD matrix, which represents the n-step-ahead error forecast, is calculated by using the following equation:

$$b_{ji}(n) = \frac{V_{jj}^{-1} \sum_{n=0}^{n-1} (\epsilon_j' p_n \prod \epsilon_i)^2}{\sum_{n=0}^{n-1} \epsilon_j' p_n p_n \prod p_n' \epsilon_i} \tag{8}$$

Where ϵ_j is vector of i^{th} (0,1) elements, whereas p_n is the coefficient matrix multiplied by n–lagged vector shock. $\prod$ is the variance matrix of the error vector ε. Moreover, V_{jj} is the i^{th} diagonal element of $\prod$. The inputs in b(n) matrix were transformed to be normal to ensure the sum of forecast error variance was 1.

3.3.2 Barunik and Krehlik (2018) Frequency Domain Spillover Method

After we tested volatility using Diebold and Yilmaz (2012), we used Barunk and Krehlik (2018) to determine the frequency domain of spillovers. This allowed us to conduct an in-depth analysis. As a result, our study provides readers with comprehensive knowledge of selected assets. Furthermore, we intend to examine which frequency spillover is more significant than others to provide additional information regarding the effect of fluctuating oil and gold returns on the elasticity of financial markets. This approach, which Barunik and Krehlik introduced in 2018, breaks down the original Diebold and Yilmaz spillover at specific frequencies. Specifically, the model is used as a formulation based on a spectral formation of deconstructing variance use. In addition, we used the function of frequency response:

$$\theta(\gamma^{-ZX}) = \sum \gamma^{-ZXr}\, \theta_r \tag{9}$$

Equation 6 was obtained from the θ coefficient's Fourier information, with z = $\sqrt{-1}$. The general causality spectrum across frequencies, with $\theta \in$ (-n, n), was calculated as follows:

$$f(\theta)_{i,n} = \frac{\omega_{nn}^{-1}|(\theta(\gamma^{-ZX})\sum i,n|^2)}{\theta(\gamma^{-ZX})\sum \theta'(e^{+zx})i,i} \quad (10)$$

Where $\theta(\gamma^{-ZX}) = \sum_m \varepsilon^{-izx}\ \theta_m$ denotes the Fourier modification in the impulse response θ. However, the $(f(\theta)_{i,n}$ displays the component of the spectrum of the ith variable at frequency θ, taking into consideration shocks in the nth variable. Eq. (7) was used to quantify within-frequency causality depending on the spectrum of the ith variable with frequency θ. Finally, we measured the pairwise connectedness from Y to X at frequency F using the following equation:

$$\breve{\rho}_{YX}(F) = \frac{\rho_{YX}(F)}{\sum_{n=1}^{n}\rho_{YX}(F)} \quad (11)$$

To estimate the generalized forecast error variance decompositions on frequency band $B = (K, L): K, L \in (-N, N), K < L$, we used the following equation:

$$\breve{\rho}_{YX}(B) = \int_K^L \breve{\rho}_{YX}(F)BF \quad (12)$$

Comprehensive connectedness (CF) among the frequency band F was defined as:

$$C^F = \frac{\sum_{i=1,i\neq j}^{j}\breve{\rho}_{YX}(B)}{\sum_{YX}\breve{\rho}_{YX}(B)} = 1 - \frac{\sum_{i=1}^{j}\breve{\rho}_{YX}(B)}{\sum_{YX}\breve{\rho}_{YX}(B)} \quad (13)$$

The total directional connectedness from and to between variables E and G was estimated using the following formulas respectively:

$$C_{i\leftarrow *}^{F} = \sum_{i=1,i\neq j}^{j}\breve{\rho}_{YX}(B) \quad (14)$$

$$C_{i\to *}^{F} = \sum_{i=1, i\neq j}^{j} \check{\rho}_{YX}(B) \tag{15}$$

Using equations 11 and 12, we can estimate the directional connectedness from oil and gold returns to elasticity in the short, medium, and long term (and vice versa) during the time domain. For instance, the short term represents high frequency. It is located between 1 to 4 days, the medium term represents the medium frequency, and the period of 10 to ∞ days represents the long term and low frequency (Barunik and Krehlik, 2018). However, studying different frequencies gives us a better understand of the variance (shock) interaction between variables during different periods.

3.3.3 Bivariate and Partial Wavelet Coherency

To visualize previous methods' results and investigate co-movements among variables during the time, we used BWC, which Torrence and Compo (1998) proposed and Grinsted et al. (2004) developed. This method is used to obtain information about frequency and time together. It provides effective periodic signal detection and separation by balancing over time and frequency localization. Furthermore, it allows a better trade-off between identifying cycles and peaks or discontinuities (Frimpong et al., 2021). Wavelet coherence uses a filter window "mother wavelet" to explain the information during the time, which can be, calculated using the following equation:

$$\psi_{\alpha,\beta} = \frac{1}{\sqrt{\alpha}}.\psi\left(\frac{t-\beta}{\alpha}\right), \alpha, \beta \in R, \alpha \neq 0 \tag{16}$$

Where (α and β) are, respectively, the scaling and translation coefficient belonging to a real number, and ψ is the length of the mother wavelet ranging from -1 to 1. To express the BWC (ϱ_p^2) between response variable Y and predictor variable X, we used Hu et al.'s (2017) equation notation:

$$\varrho^2_{(\alpha,\beta)} = \frac{\overset{\leftrightarrow}{\delta} Y, X_{(\alpha,\beta)} \overset{\longleftrightarrow}{\overset{\leftrightarrow}{\delta} Y, X_{(\alpha,\beta)}}}{\overset{\leftrightarrow}{\delta} X, X_{(\alpha,\beta)} \overset{\leftrightarrow}{\delta} Y, Y_{(\alpha,\beta)}} \tag{17}$$

Where $\overset{\leftrightarrow}{\delta} X, X_{(\alpha,\beta)}, \overset{\leftrightarrow}{\delta} Y, Y_{(\alpha,\beta)}$ and $\overset{\leftrightarrow}{\delta} Y, X_{(\alpha,\beta)}$ are bivariate matrices of the smoothed cross-wavelet predator between variables Y and X. The wavelet point between response and impulse variable Y and X was determined by the following:

$$\varphi_{(\alpha,\beta)} = \tan^{-1}\left(\frac{(im(\delta^{(Y,X)}(\alpha,\beta)}{re(\delta^{Y,X}(\alpha,\beta)}\right) \tag{18}$$

Where (im) is the imaginary part of $\delta^{(Y,X)}(\alpha,\beta)$, and (re) is the real part. As we mentioned earlier, our goal was to measure conditional co-movements among studies' variables. In other words, we wanted to measure the impact of COVID-19 on stock market elasticity and on the relationship between variables. Hence, we used an improved version of PWC (Hu & Si, 2021), an extension of Koopmans' (1974). Koopmans changed the scale domain to the location-scale domain. The PWC (ρ) between X and Y after removing the effect of Z at scale α and location (β) is presented in equation (18). The symbol (.) means that we excluded the variable Z:

$$\rho_{(YX)}.Z = \sqrt{\frac{\left|1-\varrho^2_{Y,X}.Z(\alpha,\beta)\right|^2 \varrho^2_{Y,X}.(\alpha,\beta)}{1-(\varrho^2_Y.Z(\alpha,\beta)(\varrho^2_X.Z(\alpha,\beta))}} \tag{19}$$

Finally, the conical shape shown in gray is the significance interval. The rows inside inside this cone were considered to represent a significant movement (relationships) among variables. Figure 1 summarize the explanation of wavelet map.

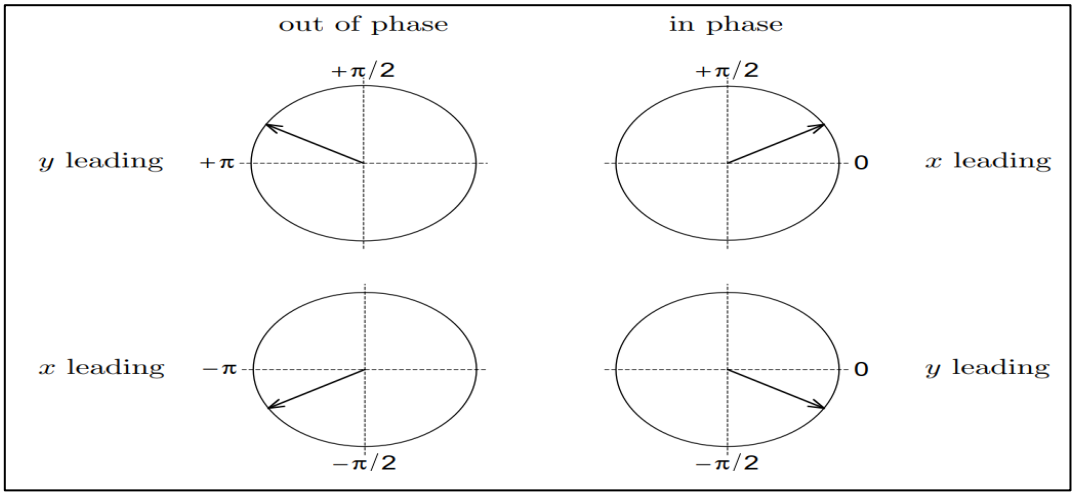

Figure 15: The interpretation of phase-differences

Chapter 4

EMPIRICAL RESULTS

4.1 Descriptive Statistic

I started by reporting the primary descriptive statistic and the results in Table 3. The Jordanian stock market has the highest average market elasticity, whereas the Saudi market has the lowest. The average elasticity in Saudi Arabia, Turkey, Egypt, UAE, and Kuwait is 0.00, which means that the market is inelastic. In other words, the change in stock price does not attract investors to invest in the stock market. Moreover, it indicates that these markets have factors other than price determining their attractiveness to investors.

On the other hand, the elasticity of Qatar and Bahrain stock markets indicates that they are less attractive to investors when liquidity increase among investors. In other words, investors in these markets do not react positively to the news of the decline in stock prices. According to the kurtosis values, the elasticity curves follow a leptokurtic distribution in most markets because they have a thick tail. The stock market elasticity is also homogenous, where the standard deviation values are relative.

Table 3: Descriptive statistic for the trading elasticity coefficients, oil return and gold return.

Index	Mean	Median	Max	Min	SD	Skewness	Kurtosis
Saudi Arabia	0.00	0.00	0.75	-0.83	0.22	0.06	1.13
Turkey	0.00	0.00	1.29	-1.21	0.25	0.19	5.97
Jordan	1.11	1.01	6.63	0.39	0.53	6.37	54.72
Bahrain	-0.02	0.05	3.53	-6.20	0.64	-2.44	26.39
Egypt	0.00	0.00	2.29	-1.63	0.44	0.36	3.47
UAE	0.00	-0.02	1.41	-1.11	0.38	0.19	0.98
Kuwait	0.00	0.00	1.25	-0.90	0.13	0.61	34.45
Qatar	-0.02	0.00	1.38	-2.57	0.27	-5.34	51.85
Oil return	0.00	0.00	0.50	-0.40	0.05	-0.13	39.64
Gold return	0.00	0.00	0.06	-0.07	0.01	-0.93	5.37

After that I reported the elasticity spillover effect among Middle East countries. Then, I presented the test results for each country separately to achieve a better comparison among the financial markets of those countries.

4.2 Transient Effect on The Elasticity of Middle East Stock Market

Table 3 shows Diebold and Yılmaz's (2012) test results. According to table 3, most of the variation in the elasticity of the stock market comes from the market itself. However, we can also notice spillover effects among countries. For instance, most of the Jordanian stock market elasticity variation comes from the Kuwaiti stock market by 45%. Moreover, the Qatari stock market participates 35% of the Jordan stock market. Saudi stock market participates by 15% of the elasticity of the Jordanian stock market. Furthermore, the Turkish stock market participates by 11% of the elasticity of the Jordanian stock market. On the other hand, the test shows that the lowest return spillover on the elasticity of the Jordanian stock market is from Egypt by only 1%.

Conversely, most of the Egyptian stock market elasticity variation has come from the Jordanian stock market. While the Saudi market participates by 41% of Egyptian stock market elasticity. 12%, 3%, and 2% is the connectedness rate between the Egyptian stock market elasticity and the Qatari, Kuwaiti, Turkish UAE stock markets

elasticity, respectively. Nevertheless, the lowest connectedness rate is between Bahrani and Egyptian stock market elasticity.

According to the test results, the Bahraini market is one of the most isolated markets, with more than 99% elasticity change coming from the Bahrani market itself. Moreover, the source of elasticity spillover is limited only to the Gulf markets. For instance, the Saudi market participates in 51% of the total elasticity spillover in the Bahraini stock market, and 41% and 11% of elasticity transmission comes from the Kuwaiti, Qatari, and Emirates stock markets. Nevertheless, the results indicate that the Jordanian stock market does not affect the elasticity of the Bahraini stock market.

Considering that the Saudi market is one of the largest oil-exporting markets, the influence of the rest of the financial markets on it is very weak or non-existent, with more than 99% elasticity coming from the Saudi market. This effect is limited to Gulf markets, even with influences from other markets. For instance, the Kuwaiti market participates in 24% of elasticity variation in the Saudi market, while the Emirates, Qatar, and Bahrain markets participate in 32% in determining the elasticity of the Saudi market.

Like other Gulf markets, the elasticity of the Kuwaiti market is mainly affected by Gulf markets. The elasticity of the Saudi market constitutes the most specific source of the elasticity of the Kuwaiti market, with a rate of 41%. While the elasticity of the markets of Bahrain, Qatar, and the UAE affects 25%, 12%, and 13%, respectively. At the same time, the least influential market is the Jordanian market, with only 3%.

Table 4: Diebold and Yilmaz's test for return spillover connectedness among countries

Country	Jordan	Egypt	Bahrain	KSA	Kuwait	Qatar	Turkey	UAE	FROM
Jordan	98.36	0.01	0.14	0.15	0.45	0.35	0.12	0.11	0.2
Egypt	0.55	99.01	0.01	0.41	0.03	0.12	0.02	0.02	0.12
Bahrain	0.00	0.07	99.21	0.51	0.41	0.11	0.01	0.11	0.1
KSA	0.04	0.01	0.09	99.94	0.25	0.11	0	0.12	0.01
Kuwait	0.03	0.06	0.25	0.41	99.04	0.12	0.09	0.13	0.12
Qatar	0.02	0.07	0.90	0.03	0.19	98.03	0.3	0.3	0.25
Turkey	0.22	0.03	0.06	1.91	0.65	1.11	97.02	0.01	0.37
UAE	0.13	0	0.03	0.11	0.03	0.01	0	99.72	0.04
TO	0.21	0.03	0.19	0.37	0.27	0.09	0.1	0.15	TCI = 1.9

The Qatari market is considered one of the most reactive Arab markets with the flexibility of the Turkish market, with a connectedness factor of 30%. At the same time, the change in the elasticity of the Bahraini market is the most influential among other markets, with a connectedness factor of 91%. On the other hand, the flexibility of the Jordanian market has less impact on the Qatari market by only 0.7%.

The elasticity of the Turkish market, according to table 4, is one of the most affected by the rest of the financial markets in the middle east. For example, the elasticity of the Jordanian stock market affects the Turkish market by 0.22%, while the most significant impact comes from the Saudi and Qatari markets by 1.91% and 0.65%, respectively. On the other hand, the lowest transmission comes from the Egyptian and Emirati markets at 0.03% and 0.01%, respectively.

Finally, table 4 presents the Emiratis market, which is almost isolated. For instance, the Jordanian elasticity of the stock market is responsible for only 0.13% of the total elasticity in the UAE stock market. Moreover, the results show that the Egyptian stock market elasticity has no connectedness with the UAE stock market.

Table 4 indicates that the contribution factor for overall connectedness (TCI) among variables is 1.9%, which refers to the degree of association and spillover effect between the stock market. To find out more details about the impact on the extent to

which countries affect the elasticity of each other, whether in the long, medium, or short term, and to provide additional information about the variables' pairwise spillover, we used Barunik and Krehlik's (2018) frequency domain spillover method. Table 4 reports the results. The frequency of one day to four days contributes 1.42% to overall connectivity; the frequency of four days to 10 days contributes just 0.23% to total spillover; and the last frequency of 10 days to infinity provides 0.14% of overall connectivity, which shows that the total connectivity decreases during the time.

Table 5: Barunik and Krehlik (2018) test of frequency domain spillover for among countries.

Count	JOR	Egy	BA	KSA	KUT	QAT	Turk	UAE	FROM_ABS	FROM_WTH
The spillover between 1 day to 4 days.										
Jordan	80.6	0.03	0.26	0.14	0.71	0.33	0.26	0.12	0.22	0.29
Egypt	0.5	73.32	0.17	0.11	0.41	0.1	0.09	0.11	0.16	0.21
Bahrain	0.06	0.15	75.25	0.51	0.66	0.05	0.29	0.25	0.18	0.24
KSA	0.02	0.01	0.11	75.3	0.25	0.01	0.01	0.14	0.01	0.01
Kuwait	0.14	0.32	0.54	0.21	74.37	0.09	0.14	0.11	0.19	0.25
Qatar	0.04	0.03	0.17	0.13	0.27	71.34	0.35	0.19	0.24	0.31
Turkey	0.13	0.03	0.04	1.44	0.69	0.15	73.12	0.01	0.36	0.47
UAE	0.19	0	0.16	0.51	0.02	0.01	0.01	74.81	0.06	0.08
To_ABS	0.19	0.07	0.3	0.61	0.35	0.09	0.14	0.16	TCI =1.42	
To_WTH	0.26	0.09	0.4	0.57	0.45	0.12	0.19	0.18		TCI =1.86
The spillover between 4 days to 10 days.										
Jordan	1.32	0.01	0.01	0.11	0.12	0.03	0.02	.10	0.03	0.17
Egypt	0.13	15.85	0.04	0.1	0.06	0.02	0.03	0.08	0.03	0.22
Bahrain	0.01	0.08	14.81	0.31	0.03	0.03	0.08	0.16	0.04	0.24
KSA	0.01	0.00	0.00	15.78	0.00	0.00	0.00	0.12	0.00	0.01
Kuwait	0.09	0.12	0.04	0.1	15.04	0.02	0.06	0.09	0.04	0.28
Qatar	0.01	0.01	0.06	0.11	0.03	16.78	0.02	0.03	0.02	0.14
Turkey	0.04	0.02	0.05	0.28	0.06	0.1	15	0.01	0.06	0.37
UAE	0.03	0	0.05	0.22	0.01	0	0	15.71	0.01	0.08
To_ABS	0.04	0.03	0.03	0.4	0.04	0.01	0.02	0.11	TCI =0.23	
To_WTH	0.27	0.19	0.2	0.25	0.26	0.09	0.16	0.08		TCI =1.51
The spillover for more than10 days										
Jordan	5.97	0.01	0	0.5	0.08	0.02	0.02	0.03	0.02	0.19
Egypt	0.07	9.12	0.03	0.08	0.03	0.01	0.01	0.02	0.02	0.22
Bahrain	0.01	0.06	7.98	0.25	0.02	0.02	0.05	0.03	0.02	0.29
KSA	0.01	0.00	0.00	8.84	0.00	0.00	0.00	0.09	0.00	0.01
Kuwait	0.05	0.08	0.01	0.06	8.51	0.01	0.04	0.03	0.02	0.28
Qatar	0.01	0.00	0.02	0.1	0.01	9.77	0	0.02	0.01	0.09
Turkey	0.02	0.01	0.02	0.17	0.01	0.08	8.36	0.00	0.03	0.32
UAE	0.01	0.00	0.02	0.01	0.01	0	0	8.84	0.01	0.07
To_ABS	0.02	0.02	0.01	0.25	0.02	0.01	0.02	0.07	TCI =0.13	
To_WTH	0.26	0.23	0.13	0.25	0.24	0.1	0.19	0.08		TCI =1.48

According to table 5, the effect of Jordanian stock market elasticity decreases during the time, as most of its effect is limited to the short term and weakens in the long term with absolute connectivity factors 0.19%, 0.04%, and 0.2% in the short, medium, and long term. At the same time, the influence of the Egyptian market appears to be disappearing at a faster rate, where the total connectivity factors are 0.03%, 0.03, and 0.01% during short, medium, and long-run rates. Moreover, in the long run, there

is no effect from the Egyptian market on Saudi Arabia, Jordan, and Kuwait markets, where the connectivity factor has reached zero.

When we include the time-variant in the study of the interdependence between the two markets, the elasticity of the Bahraini market affects the other markets in the short term only. This result is consistent with what was reached in the previous test considering the size of the Bahraini market compared to the rest of the other Gulf markets. According to table 4, the total effect factors, in short, medium, and long term, are 0.3%, 0.03%, and 0.01%, respectively. This means that the increase or decrease in the activity of the Bahraini market has a slight impact on the rest of the region's markets. In other words, the Bahraini market has no role in determining the extent of the elasticity of other markets.

On the other hand, the elasticity of the Saudi market impacts the rest of the financial markets in the short, medium, and long term. This result is in line with the fact that the Saudi market is one of the largest in the region. However, in table 4, the total connectivity factors for the Saudi stock market elasticity are 0.61%, 0.4%, and 0.25% for the short, medium, and long term. This is in contrast to the previous markets, whose impact is limited to the short term.

The connectivity factor for the Kuwaiti market elasticity up to 4 days is 0.35%, between 4 to 10 days is 0.04%, and 0.02% for more than ten days. These results indicate that the effect of the elasticity of the stock market is limited in the short run only since it decreased dramatically after four days.

The consequences of the Qatari-Gulf crisis are evident through the low impact of the Qatari market elasticity on the Gulf and Egyptian markets. However, this relationship is limited to the short term. On the other hand, Turkish-Qatari relations also appear from the interaction volume between the Qatari and Turkish markets,

where the impact of the elasticity of the Qatari market on the elasticity of the Turkish financial market extends to the long term. Nevertheless, the total connectivity factor for the Qatari stock market elasticity in the short run (between 0 to 4 days) is 0.09%, 0.01% in the medium term (between 4 - 10 days), and 0.01% in the long-term (10 - ∞).

The impact of the elasticity of the Turkish financial market is also limited to the short term. Looking at the table, we note that the total spillover coefficient begins to fade after four days of the change in the elasticity of the Turkish financial market. This indicates that the Turkish market's shocks do not extend to the rest of the Middle East markets in the long term. However, the total connectivity factor from the Turkish stock to other Middle East stock markets in the short-run is 0.14%, while 0.01% in the medium and long-run.

Lastly, Table 5 shows the impact of the UAE market on the rest of the region's markets, as it is one of the most important financial centers in the Middle East. The total spillover coefficients show that the UAE stock market elasticity extends to the long term, where the total connectivity factor between 0-4 days is 0.16%, 0.11% between 4 to 10 days, and 0.07% for more than ten days.

The results generally indicate an interaction between oil-exporting countries, while it is less for importing countries. The Saudi market is also the largest source for determining the elasticity of the Middle East markets. The Jordanian and Turkish markets are the most affected by the elasticity of the region's markets. Finally, the Bahraini market is considered one of the least influential financial markets on the elasticity of the region's markets. Figure 16 summarizes this relationship. According to the figure, The Kuwaiti, Jordanian and Turkish markets are the financial markets most affected by the elasticity of other regional financial markets. In contrast, the Egyptian and Bahraini markets have the least interaction with other financial markets

in the Middle East. Figure 17 shows the total elasticity spillover in the system, where it shows the total elasticity spillover effect decay toward zero in the long run.

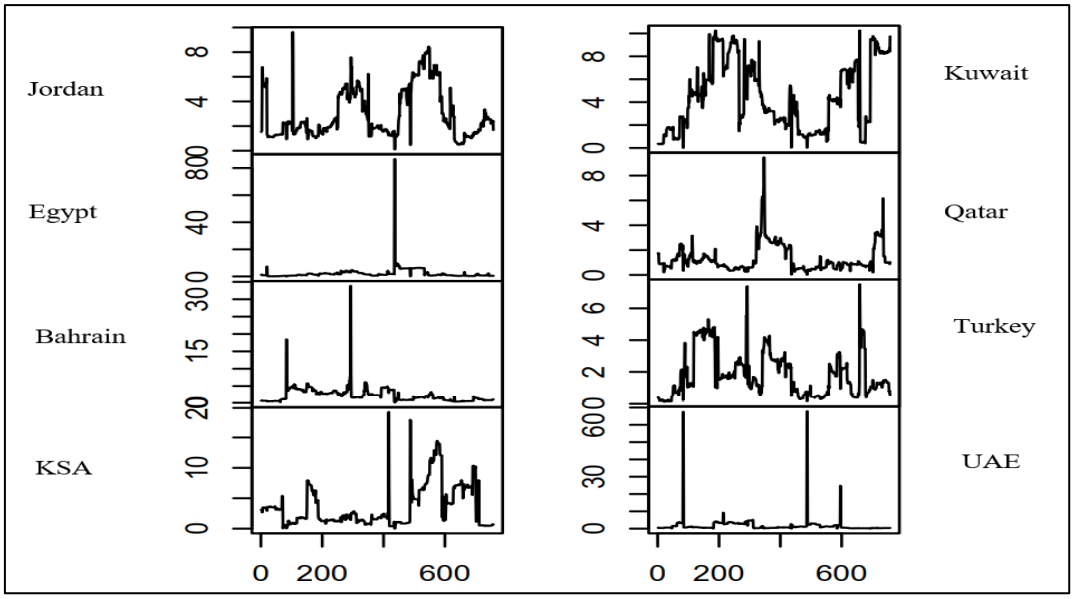

Figure 16: Barunik and Krehlik (2018) test, total spillover elasticity effect by the Middle East stock market

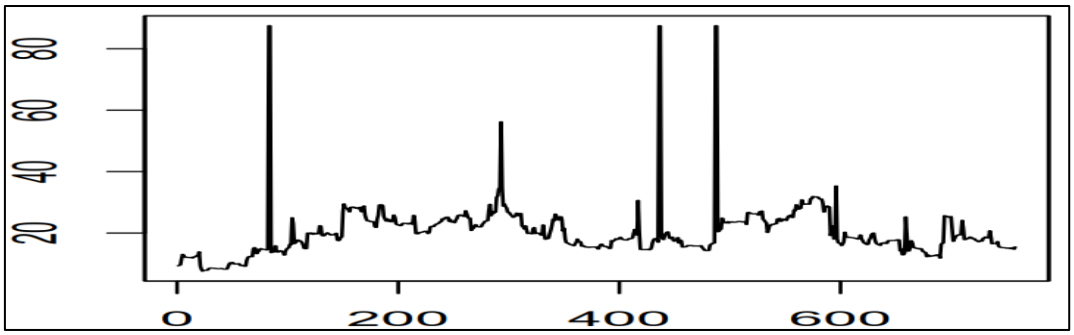

Figure 17: Barunik and Krehlik (2018) test, total elasticity spillover in the system

However, based on the above, the test results reject the null hypotheses and show an association between the financial market in the Middle East. The results are constant with Habibi & Mohammadi (2022) and Mensi et al. (2021) explaining the Saudi market's vital role as a strong influence on the Middle East markets. While she differed with Panda et al. (2019) that the shocks that affect the Egyptian market affect the Jordanian market, based on the results of this dissertation, the Egyptian market is

considered a net receivable for shocks in the Middle East. Furthermore, regarding the relationship among the Arab Gulf countries, our study agreed with Tien and Hung (2022), which found a shock transmission effect between the Arab Gulf markets. The dissertation also confirmed what Abou-Zaid (2011) found, where he concluded a weak relationship between the Turkish and Egyptian financial markets. Finally, the results of this dissertation agree in part with the study of Bouri and Yahchouchi (2014), where they showed that the relationship between the Middle East markets might extend to short, medium, or long-term periods. Whereas, based on the test results, some markets have a limited impact on short periods (e.g., Bahrain, Kuwait, and Egypt).

4.3 The Impact of Oil and Gold Returns on Each of The Financial Markets

4.3.1 Jordanian Stock Market

Table 6 shows Diebold and Yılmaz's (2012) test results. According to Table 6, gold and oil returns affect the Jordanian stock market's elasticity by 1.24% and 0.41%, respectively. This finding represents variations in gold returns that contribute to Jordanian stock market elasticity variations more than in oil returns. In comparison, the market causes variations in stock market elasticity by 98.12%. In addition, table 5 indicates that the contribution factor for overall connectedness (TCI) among variables is 1.46%. These results are inconsistent with those of Kumar et al. (2021), who argued that only oil and not gold affect the stock market, and Jain (2016), who concluded that gold and oil returns have a symmetric impact on the stock market. According to our findings, however, the effect of gold and oil on stock market elasticity is asymmetric.

Table 6: Diebold and Yilmaz's test for return spillover connectedness in the Jordanian stock market, oil returns, and gold returns

Variables	**Elasticity**	**Oil return**	**Gold return**	**FROM**
Elasticity	98.12	0.08	1.20	0.63
Oil return	0.41	98.83	0.70	0.30
Gold return	1.24	0.10	98.66	0.45
TO	0.55	0.20	0.65	TCI = 1.46

To find out more details about the impact on the extent to which gold affects the elasticity of the Jordanian market, whether in long, medium, or short term, and to provide additional information about the variables' pairwise spillover, we used Barunik and Krehlik's (2018) frequency domain spillover method. Table 7 reports the results. The frequency of one day to four days contributes 1.14% to overall connectivity; the frequency of four days to 10 days contributes just 0.21% to total spillover; and the last frequency of 10 days to infinity provides 0.11% of overall connectivity. Furthermore, gold is the most critical ingredient in this system. More specifically, gold contributes 0.58%, 0.86%, and 0.90% of total spillover.

Table 7: Barunik and Krehlik test of frequency domain spillover for the Jordanian stock market, oil returns, and gold returns

Variables	**Elasticity**	**Oil return**	**Gold return**	**FROM_ABS**	**FROM_WTH**
The spillover between 1 day to 4 days.					
Elasticity	74.08	0.65	0.77	0.47	0.62
Oil return	0.28	70.69	0.55	0.28	0.37
Gold return	1.07	0.10	78.45	0.39	0.52
To_ABS	0.45	0.25	0.44	TCI = 1.14	
To_WTH	0.60	0.33	0.58		TCI = 1.51
The spillover between 4 days to 10 days.					
Elasticity	15.34	0.03	0.28	0.10	0.66
Oil return	0.08	17.47	0.12	0.07	0.43
Gold return	0.13	0.01	13.17	0.04	0.28
To_ABS	0.07	0.01	0.13	TCI = 0.21	
To_WTH	0.44	0.07	0.86		TCI= 1.37
The spillover for more than10 days					
Elasticity	8.70	0.00	0.15	0.05	0.59
Oil return	0.05	10.68	0.09	0.05	0.52
Gold return	0.04	0.00	7.03	0.01	0.14
To_ABS	0.03	0.00	0.08	TCI = 0.11	
To_WTH	0.34	0.01	0.90		TCI = 1.25

In contrast, the impact of oil decreases over time until it diminishes in the long term. The impact of oil return on the stock market elasticity is only limited in the short run. For instance, oil return affects elasticity by 0.65% during the first four days, and it vanishes after 10 days. Table 6 indicates that the primary determinant of Jordanian stock market elasticity is previous elasticity values.

We employed bivariate wavelet analysis to visualize co-movements between gold and oil returns and stock market elasticity. Moreover, we used partial wavelet coherency to eliminate the effect of COVID-19 on the relationship between variables, and figure 18 presents the results. The X-axis, observation 1, corresponds to Monday, June 1, 2020; observation 200 corresponds to Thursday, December 17, 2020; and observation 370 corresponds to Tuesday, June 8, 2021. The arrows show the differences in phase between the two series. Right-pointing arrows indicate that the variables are in phase (co-move). Right-downward-pointing arrows indicate that oil and gold returns drive elasticity. Right-upward-pointing arrows suggest that oil and gold returns follow elasticity. The variables are considered out of phase if the arrows point to the left. The arrows that point to the left and up show that oil or gold returns are lagging. The arrows that point to the left and down show that oil or gold returns are leading. The coloring scale on the right shows the different significance levels. The color gradient is red, which indicates a statistically significant effect, to dark blue, which indicates the absence of any relationship.

We divided the comparison into four stages. Figure 18-A shows the relationship between oil and stock market elasticity. Oil return fluctuation leads the market elasticity in only a specific period. After that, the relationship becomes undetermined. After controlling the effect of COVID-19, Figure 18-B indicates that the impact of oil becomes more visible. In other words, fluctuation in oil returns did not affect elasticity

as much as the pandemic did. Regarding gold returns' volatility, in Figure 18-C, gold returns are shown to be more significant in driving elasticity than oil returns because the co-movements are significant during the whole sample period. Finally, even after COVID-19's impact is removed, in Figure 18-D, most rows indicate that gold returns significantly determine elasticity in the market. These results indicate the importance and efficacy of gold as a safe alternative investment during unexpected events from the Jordanian investors' point of view. They also indicate the significance of gold in affecting the elasticity of the Jordanian market and are consistent with prior findings.

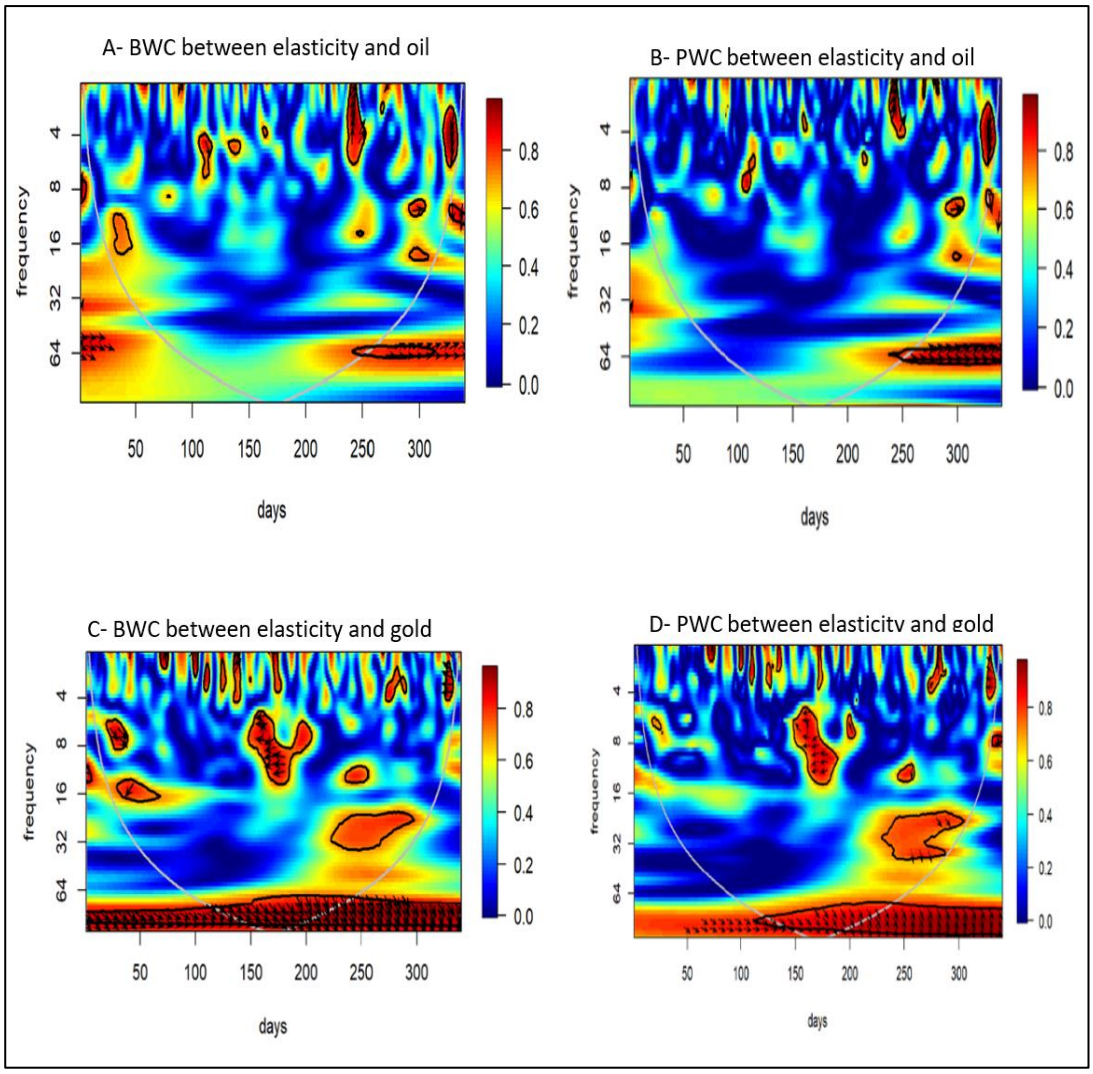

Figure 18: Jordan stock market elasticity, gold, and oil co-movement maps

4.3.2 Egyptian Stock Market

Egypt is regarded as an oil-importing country; however, compared to Jordan, oil returns more than gold affect the elasticity of the Egyptian stock market. According to Table 8, the spillover connectedness test showed that oil returns contribute 0.5%, whereas oil revenue contribute only 0.24%. However, the total contribution factor for overall connectedness is 1.23%, and most of the stock market elasticity comes from the market itself.

Table 8: Diebold and Yilmaz's test for return spillover connectedness in the Egyptian stock market, oil returns, and gold returns

Variables	**Elasticity**	**Oil return**	**Gold return**	**FROM**
Elasticity	99.26	0.50	0.24	0.25
Oil return	0.30	98.55	1.16	0.48
Gold return	0.24	1.25	98.50	0.50
TO	0.18	0.59	0.46	TCI = 1.23

To obtain more details regarding spillover connectedness between the variables, we used Barunik and Krehlik's (2018) frequency domain spillover method. Table 9 reports the results. Table 9 shows that the frequency of one day to four days contributes 0.88% to overall connectivity, the frequency of four days to 10 days contributes just 0.22% to total spillover, and the frequency of 10 days to infinity contributes 0.98% to overall connectivity. Furthermore, oil is critical in this system. It contributes 0.55%, 0.67%, and 0.90% of total spillover. In comparison with the results of Jordan, we noted that the impact of fluctuations in oil and gold prices on the elasticity of the Egyptian market increases over time, whereas the impact of oil return spillover vanishes over time.

Table 9: Barunik and Krehlik's test frequency domain spillover for the Egyptian stock market, oil returns, and gold returns

Variables	**Elasticity**	**Oil return**	**Gold return**	**FROM_ABS**	**FROM_WTH**
The spillover between 1 day to 4 days.					
Elasticity	74.65	0.19	0.11	0.10	0.13
Oil return	0.21	71.63	0.87	0.36	0.48
Gold return	0.22	1.05	74.23	0.42	0.57
TO_ABS	0.14	0.41	0.33	**TCI = 0.88**	
To_WTH	0.19	0.55	0.44		**TCI = 1.19**
The spillover between 4 days to 10 days.					
Elasticity	15.78	0.18	0.08	0.09	0.53
Oil return	0.06	16.89	0.18	0.08	0.48
Gold return	0.02	0.15	15.72	0.06	0.34
TO_ABS	0.03	0.11	0.08	TCI = 0.22	
To_WTH	0.16	0.67	0.52		TCI= 1.35
The spillover for more than10 days					
Elasticity	8.83	0.14	0.05	0.06	0.67
Oil return	0.03	10.02	0.11	0.05	0.50
Gold return	0.00	0.06	8.56	0.02	0.21
TO_ABS	0.01	0.06	0.05	**TCI = 0.13**	
To_WTH	0.13	0.69	0.56		**TCI = 1.38**

The results of the wavelet coherence test confirmed this relationship. According to Figure 19-A, oil returns are driving market elasticity. However, because only a limited number of rows lay inside the cone, the correlation existed in the first month of 2020. When COVID-19 broke out, it changed this correlation, diminishing the role of oil. Figure 19-B confirms this. After taking COVID-19 into account, the number of

arrows inside the cone reduces whereas the number of rows outside the cone increases. In other words, before the coronavirus pandemic, oil was driving elasticity, but the relationship changed after the pandemic and oil lost its effect on elasticity. Although elasticity has been demonstrated to be less affected by gold, the influence of gold returns on the Egyptian market, as Figure 19-C indicates, is limited and the linkage is not directional. Figure 19-D shows that the connection does not change substantially when the coronavirus effect is excluded. The disparities between the Jordanian and Egyptian markets emerge here, with Jordanian investors resorting to gold as a safe alternative and Egyptian investors selecting other investment options.

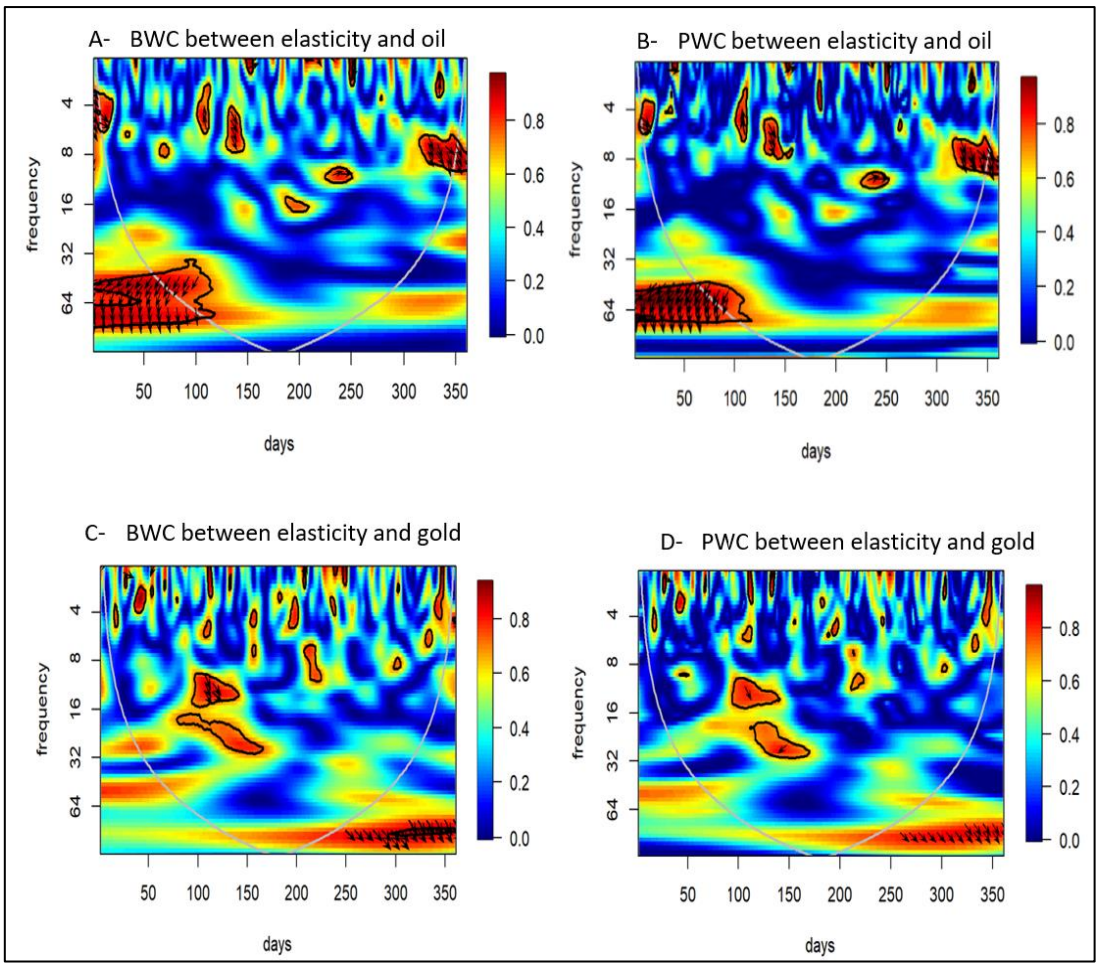

Figure 19: Egyptian stock market elasticity, gold, and oil co-movement maps

These findings contradict Wang et al. (2021), who argued that gold might be deemed a haven. Meanwhile, our results show that Egyptian investors tend to use other alternatives than gold.

4.3.3 Turkish Stock Market

Turkey is an oil-importing country. We conducted the previous tests on the Turkish market as well. Starting with Diebold and Yilmaz's test, we found that both oil and gold returns have the same effect on market elasticity: 0.51%. However, according to Table 10, what affects the elasticity of the stock market most is the stock market itself. This is consistent with Kumar et al. (2021) and Jain (2016).

Table 10: Diebold and Yilmaz's test for return spillover connectedness in the Turkish stock market, oil returns, and gold returns

Variables	**Elasticity**	**Oil return**	**Gold return**	**FROM**
Elasticity	98.99	0.51	0.51	0.34
Oil return	0.02	99.97	0.01	0.01
Gold return	0.19	0.29	99.52	0.16
TO	0.07	0.26	0.17	TCI = 0.51

Table 11 depicts the influence of the link between oil and gold returns over time on the elasticity of the Turkish stock market. Both gold and oil returns have a similar impact, which diminishes over time. The overall connectivity between the first and fourth days is 0.49%. This decreases to 0.17% from four to 10 days, and 0.09% from 10 days to infinity. Once again, these results confirm our previous results.

Table 11: Barunik and Krehlik test frequency domain spillover for the Turkish stock market, oil returns, and gold returns

Variables	**Elasticity**	**Oil return**	**Gold return**	**FROM_ABS**	**FROM_WTH**
The spillover between 1 day to 4 days.					
Elasticity	75.10	0.32	0.32	0.22	0.30
Oil return	0.01	67.05	0.20	0.07	0.10
Gold return	0.13	0.49	73.04	0.21	0.29
TO_ABS	0.05	0.27	0.17	TCI = 0.49	
To_WTH	0.07	0.37	0.24		TCI = 0.68
The spillover between 4 days to 10 days.					
Elasticity	15.26	0.14	0.15	0.10	0.56
Oil return	0.01	20.25	0.08	0.03	0.17
Gold return	0.04	0.10	16.71	0.04	0.25
FROM_ABS	0.01	0.08	0.08	TCI = 0.17	
FROM_WTH	0.08	0.46	0.44		TCI= 0.98
The spillover for more than10 days					
Elasticity	8.52	0.09	0.09	0.06	0.57
Oil return	0.00	12.35	0.05	0.02	0.19
Gold return	0.02	0.02	9.46	0.02	0.16
FROM_ABS	0.01	0.04	0.05	TCI = 0.09	
FROM_WTH	0.09	0.36	0.46		TCI = 0.91

However, to determine whether this impact would persist even during a pandemic, we conducted wavelet coherence analysis.

Figure 20 shows the coherency charts for the Turkish stock market. In Figure 20-A, the co-movements between oil and elasticity are incredibly low and limited to specific periods (e.g., June to July 2020). In Figure 20-B, we test the robustness of results by eliminating the COVID-19 effect, and the results change when the co-movements vanish except for minor days (e.g., October 2020). The relationship

between gold and elasticity (20-C & 20-D) is more significant than the Figure 20-A because the maps indicate a more statistically significant period. The pointers in the maps mentioned above fluctuate between left and right, which means the co-movements are undetermined. These results show the influence of speculators on the Turkish stock market. Market elasticity relies on not only oil or gold returns but also various buying and selling movements. Our findings confirm those of Civcir and Akkoc (2021), who argued that the effect of oil return volatility is only limited to a short period.

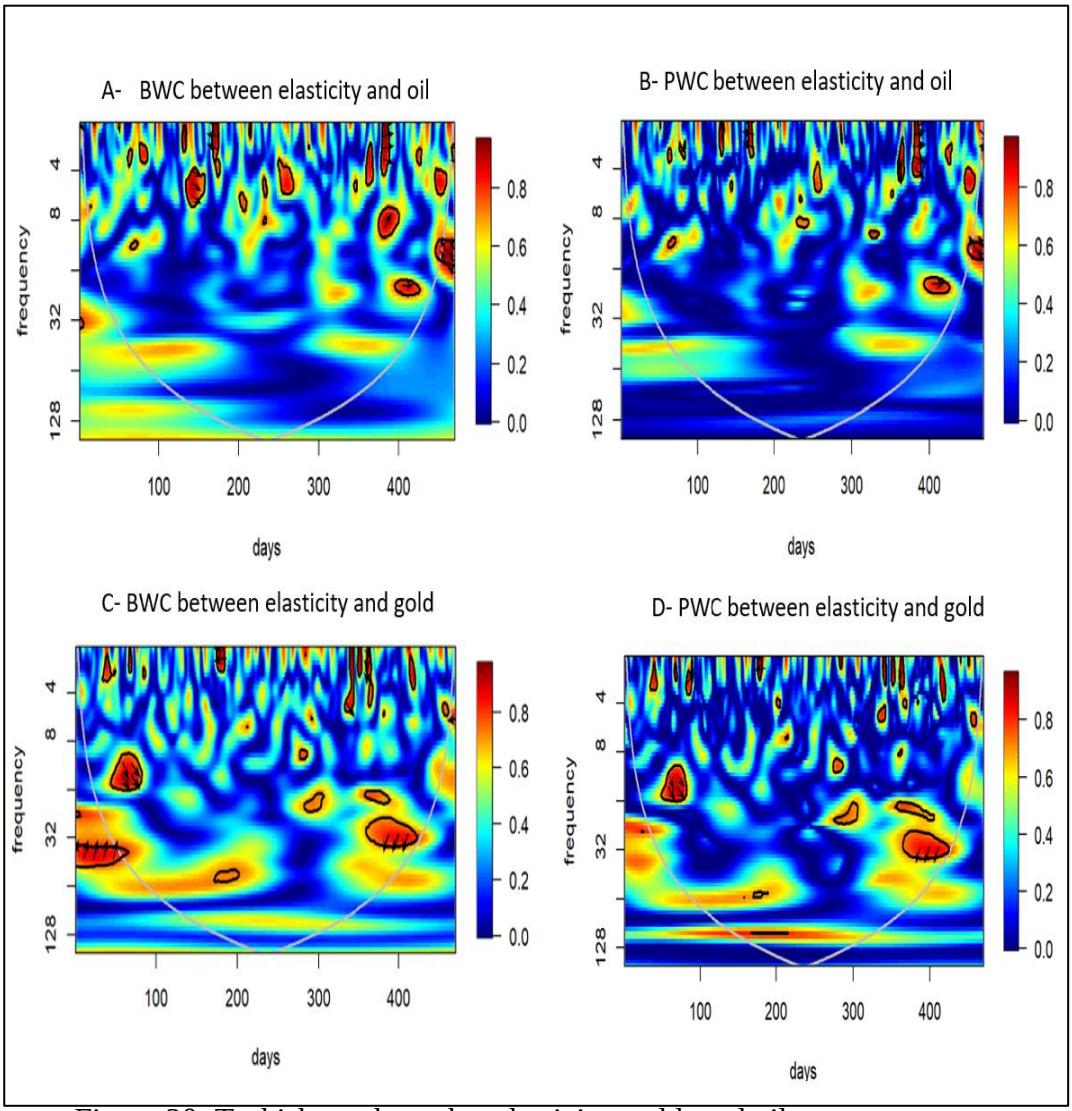

Figure 20: Turkish stock market elasticity, gold, and oil co-movement maps.

4.3.4 Bahrain Stock Market

Bahrain is an oil-exporting country. According to Table 12, which shows Diebold and Yilmaz's test results, oil return has more effect on stock market elasticity than gold. Its contribution to total elasticity variation spillover is 0.28%, whereas that of gold is only 0.15%. However, the total spillover in the system is 0.28%.

Table 12: Diebold and Yilmaz's test for return spillover connectedness in Bahrain stock market, oil returns, and gold returns

Variables	**Elasticity**	**Oil return**	**Gold return**	**FROM**
Elasticity	99.58	0.27	0.15	0.14
Oil return	0.05	99.93	0.02	0.02
Gold return	0.04	0.3	99.66	0.11
TO	0.03	0.19	0.06	TCI = 0.28

Table 13 shows the spillover connectivity between variables and the interaction among oil, gold returns, and stock market elasticity during different periods. For example, the total connectivity factor from one to four days is 1.27%, that from four to 10 days is 0.25%, and that from 10 to infinity is 0.13%. The impact of oil on market elasticity is more significant than that of gold; oil's effect remains whereas that of gold shrinks in the long run. These findings contradict those of Rafiuddin et al. (2021), who concluded that only oil return and not gold affects the Kuwait stock market. Although the effect of gold is limited to short periods, it affects the elasticity of stock markets.

Table 13:Barunik and Krehlik's test frequency domain spillover for the Bahrain stock market, oil returns, and gold returns

Variables	**Elasticity**	**Oil return**	**Gold return**	**FROM_ABS**	**FROM_WTH**
The spillover between 1 day to 4 days.					
Elasticity	75.51	0.66	0.61	0.42	0.57
Oil return	0.29	67.64	0.52	0.27	0.37
Gold return	0.60	0.83	74.36	0.48	0.65
TO_ABS	0.30	0.50	0.38	TCI = 1.17	
To_WTH	0.40	0.67	0.51		TCI = 1.59
The spillover between 4 days to 10 days.					
Elasticity	14.81	0.01	0.23	0.08	0.47
Oil return	0.08	19.37	0.14	0.07	0.45
Gold return	0.14	0.14	15.42	0.09	0.56
FROM_ABS	0.07	0.05	0.12	TCI = 0.25	
FROM_WTH	0.44	0.30	0.73		TCI= 1.48
The spillover for more than10 days					
Elasticity	8.05	0.01	0.12	0.04	0.46
Oil return	0.06	11.81	0.07	0.05	0.47
Gold return	0.07	0.04	8.4	0.04	0.39
FROM_ABS	0.05	0.02	0.07	TCI = 0.13	
FROM_WTH	0.47	0.16	0.69		TCI = 1.32

Figure 21 presents the wavelet coherency test results for the Bahrain stock market. According to Figure 21-A, oil returns are leading the elasticity. Oil returns change first, followed by elasticity. Figure 21-B shows the PWC test results. The oil-elasticity cross correlation becomes stronger with more rows inside the area of significance, confirming that oil returns are leading elasticity. However, the gold-price-elasticity relationship, in Figure 21-C, is less powerful. Few significant areas appear on the correlation map. Moreover, in Figure 21-D, after using PWC test to

exclude the COVID-19 effect, the correlation becomes undetermined, and the rows totally disappear. These findings are comparable to what we saw in the Egyptian market in terms of market elasticity being influenced more by oil returns than gold returns. Oil returns have a greater influence on the Bahrain stock market because the country's economy is mostly based on petroleum.

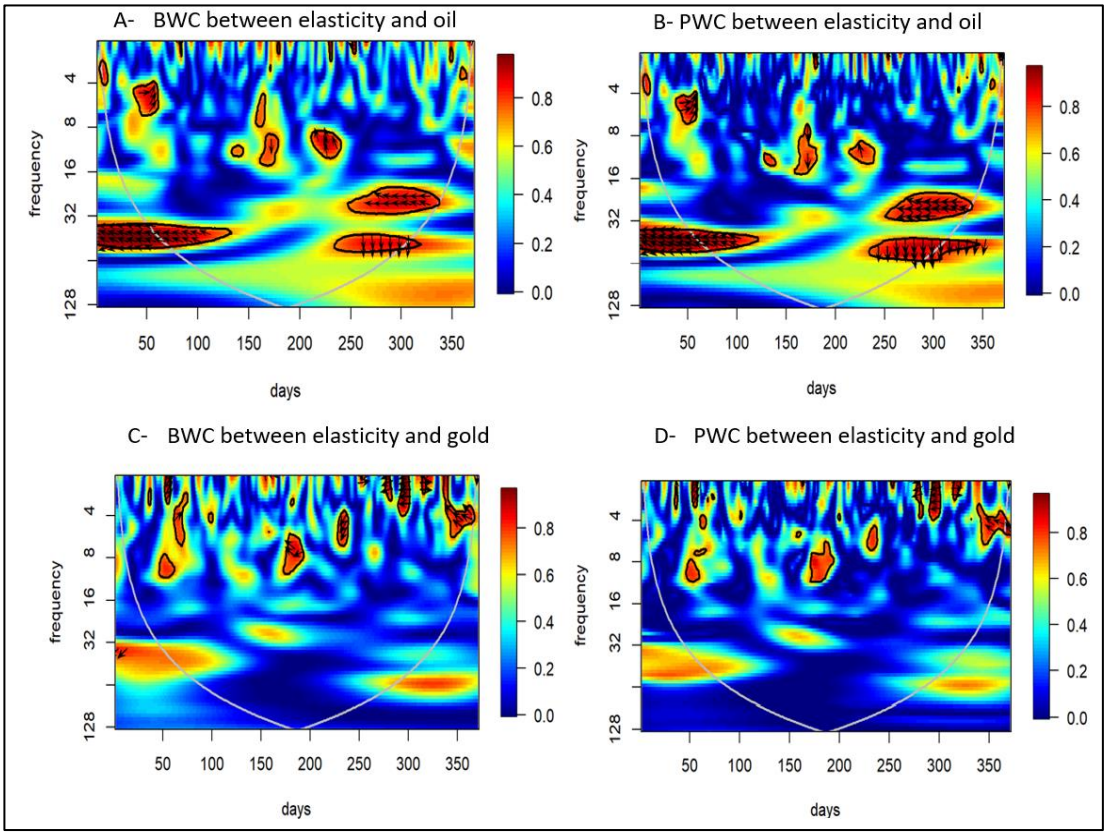

Figure 21: Bahrain stock market elasticity, gold, and oil co-movement maps

4.3.5 Kingdom of Saudi Arabia (KSA) Stock Market

KSA is one of the leading oil exporters and essential members of OPEC. According to the Diebold and Yilmaz test results (Table 14), gold return variation affects stock market elasticity by 0.32%. Oil return variation affects stock market elasticity only by 0.01%. The total connectivity factor for the system is 0.42%.

However, these results show that the Saudi market depends on multiple sources of investment and does not depend only on oil returns.

Table 14: Diebold and Yilmaz's test for return spillover connectedness for the Saudi stock market, oil returns, and gold returns

Variables	**Elasticity**	**Oil return**	**Gold return**	**FROM**
Elasticity	99.57	0.1	0.32	0.14
Oil return	0.27	99.72	0.01	0.09
Gold return	0.36	0.19	99.45	0.18
TO	0.21	0.1	0.11	TCI = 0.42

For more information about this relationship, we present the Barunik and Krehlik test results in Table 15. According to the table, the effect of oil and gold return variation increases when the total connectivity factor from day one to four is 0.94%, that from four to 10 days is 1.17%, and that for above 10 days is 1.14%. The impact of gold return increases by 0.33%, 0.55%, and 0.62%. In contrast, the impact of oil return decreases by 0.43%, 0.32%, and 0.2%.

Table 15: Barunik and Krehlik test frequency domain spillover for the Saudi stock market, oil returns, and gold returns

Variables	**Elasticity**	**Oil return**	**Gold return**	**FROM_ABS**	**FROM_WTH**
The spillover between 1 day to 4 days.					
Elasticity	73.17	0.09	0.18	0.09	0.12
Oil return	0.17	67.51	0.54	0.24	0.33
Gold return	0.23	0.84	74.02	0.36	0.49
TO_ABS	0.13	0.31	0.24	TCI = 0.68	
To_WTH	0.18	0.43	0.33		TCI = 0.94
The spillover between 4 days to 10 days.					
Elasticity	16.66	0.03	0.13	0.05	0.3
Oil return	0.06	19.48	0.16	0.07	0.43
Gold return	0.1	0.14	15.82	0.08	0.44
FROM_ABS	0.05	0.06	0.1	TCI = 0.2	
FROM_WTH	0.29	0.32	0.55		TCI= 1.17
The spillover for more than10 days					
Elasticity	9.64	0.02	0.08	0.03	0.33
Oil return	0.04	11.94	0.11	0.05	0.46
Gold return	0.06	0.04	8.75	0.04	0.35
FROM_ABS	0.03	0.02	0.06	TCI = 0.12	
FROM_WTH	0.32	0.2	0.62		TCI = 1.14

Again, we used the wavelet coherency approach to obtain more details about the relationship. In Figure (22-A), there is a change in the relationship between oil return and market elasticity. In the first 50 days, market elasticity determines oil returns, whereas on the 200th day, market elasticity becomes the determinant of oil returns. However, in general, the relationship becomes undetermined after the 200th day. These results are consistent with the size of the Saudi economy and its role as a vital member of OPEC. After testing robustness in Figure (22-B), the relationship does not change, which means that the coronavirus pandemic did not affect the relationship between oil returns and market elasticity.

These results are consistent with Tissaoui et al. (2021), who concluded that the direction of the relationship between oil return and stock market liquidity varies. Our findings indicate that the oil and gold effect is limited in the short-term and medium-term periods.

Figure (22-C) shows that gold returns had a more substantial impact on the elasticity of the Saudi stock market between 31 March and 7 July. After this period, the effect diminished. In Figure (22-D), the PWC test confirms the vital role of gold as a determinant of elasticity. These results explain Saudi investors' awareness of the danger of falling oil returns and the need to invest in gold as a safe haven. They also confirm the effectiveness of gold hedging in the Saudi market during the pandemic. However, the key difference between oil and gold returns and their correlation with the stock market elasticity is that oil returns move simultaneously with elasticity, whereas gold returns move out of phase (e.g., gold returns lead elasticity, but not instantaneously). These results are congruent with those of Rafiuddin et al. (2021), who found no long-term impact for oil or gold return on stock market elasticity.

However, they are inconsistent with Albulescu et al. (2021), who found that COVID-19 does not affect the relationship among oil, gold, and the stock market.

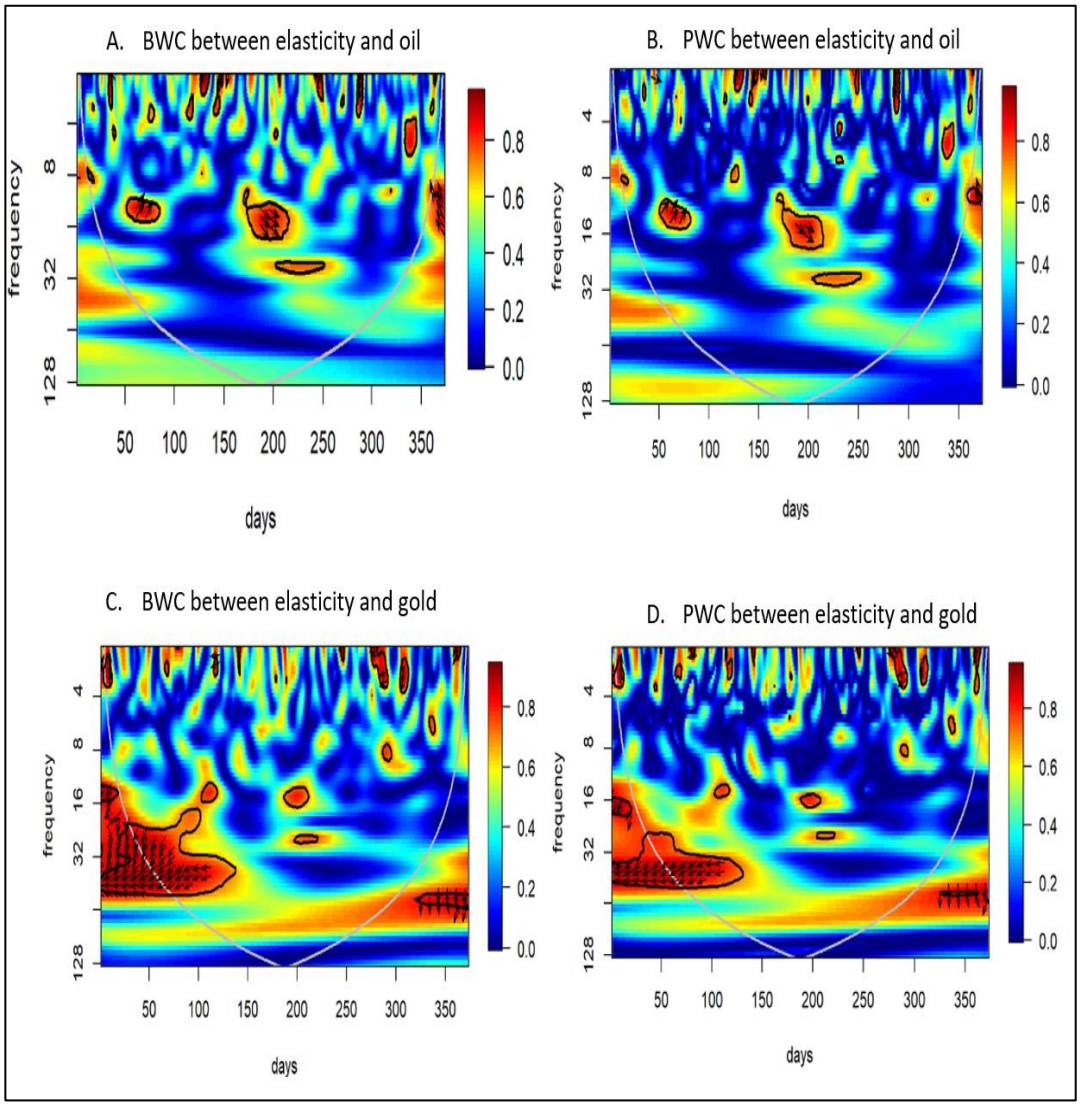

Figure 22: Saudi stock market elasticity, gold, and oil co-movement maps

4.3.6 UAE Stock Market

The UAE economy is considered open and not solely dependent on oil revenues. In comparison to the Saudi and Bahrain markets, according to Table 16, gold returns more than oil affect the elasticity of the UAE financial market. Oil return variation affects elasticity movement by 0.08%, whereas gold return variation affects elasticity movement by 0.16%. However, the system's total connectivity factor is 0.28%.

Table 16: Diebold and Yilmaz's test for return spillover connectedness in the UAE stock market, oil returns, and gold returns

Variables	Elasticity	Oil return	Gold return	FROM
Elasticity	99.76	0.08	0.16	0.08
Oil return	0.07	99.92	0.00	0.03
Gold return	0.21	0.33	99.46	0.18
TO	0.09	0.13	0.05	**TCI = 0.28**

Table 17, which shows the Barunik and Krehlik connectivity test results, indicates that the total connectivity factors to the system are decreasing over time. Where TCI between one to four days is 1.19%, that from four to 10 days is 0.18%, and that for more than 10 days is 0.07%. These results indicate that in the long run, the effect of gold and oil returns vanish. In the short run, gold returns provide more variation for stock market elasticity than oil returns: 0.83% for gold returns compared with 0.21% for oil prices. These results reflect the stability of the UAE market against fluctuations in the prices of crude and gold. Moreover, they confirm Rafiuddin et al.'s (2021) results.

Table 17: Barunik and Krehlik's test frequency domain spillover for the UAE stock market, oil returns, and gold returns

Variables	Elasticity	Oil return	Gold return	FROM_ABS	FROM_WTH
The spillover between 1 day to 4 days.					
Elasticity	74.39	0.21	0.83	0.35	0.47
Oil return	0.17	68.12	0.55	0.24	0.33
Gold return	0.84	0.97	74.03	0.60	0.82
TO_ABS	0.34	0.39	0.46	**TCI = 1.19**	
To_WTH	0.46	0.54	0.63		**TCI = 1.62**
The spillover between 4 days to 10 days.					
Elasticity	15.64	0.03	0.05	0.03	0.16
Oil return	0.03	19.29	0.14	0.06	0.35
Gold return	0.13	0.15	15.44	0.09	0.55
TO_ABS	0.05	0.06	0.06	**TCI = 0.18**	
To_WTH	0.31	0.35	0.38		**TCI= 1.05**
The spillover for more than10 days					
Elasticity	8.82	0.01	0.02	0.01	0.08
Oil return	0.03	11.58	0.08	0.04	0.37
Gold return	0.04	0.04	8.37	0.03	0.27
TO_ABS	0.02	0.02	0.03	**TCI = 0.07**	
To_WTH	0.23	0.16	0.33		**TCI = 0.72**

Figure 23 presents the wavelet results regarding the co-movements among variables. Figure 23-A indicates that the oil-returns-elasticity relationship is out of phase and that oil returns are leading stock market elasticity. Furthermore, the PWC test results in Figure 23-B confirm the direction of the relationship, with the rows pointing in the same direction. Figure 23-C indicates increasing demand for gold as a safe haven, leading to an increase in gold returns. This increase is due to the increase in market elasticity. In other words, elasticity drives gold returns. Nonetheless, after the PWC test is used to account for COVID-19, the effect of elasticity on gold returns becomes less. This suggests that, in addition to elasticity, gold is influenced by investors' fears of the coronavirus outbreak turning into a serious economic disaster, forcing them to take shelter in traditional havens. Our findings are in line with those of Wang et al. (2021), who argued that investors in the UAE market consider gold a safe haven. However, they contradict the results of Haroon and Rizvi (2020) and Zaremba et al. (2021), who argued that COVID19 did not significantly affect the UAE market.

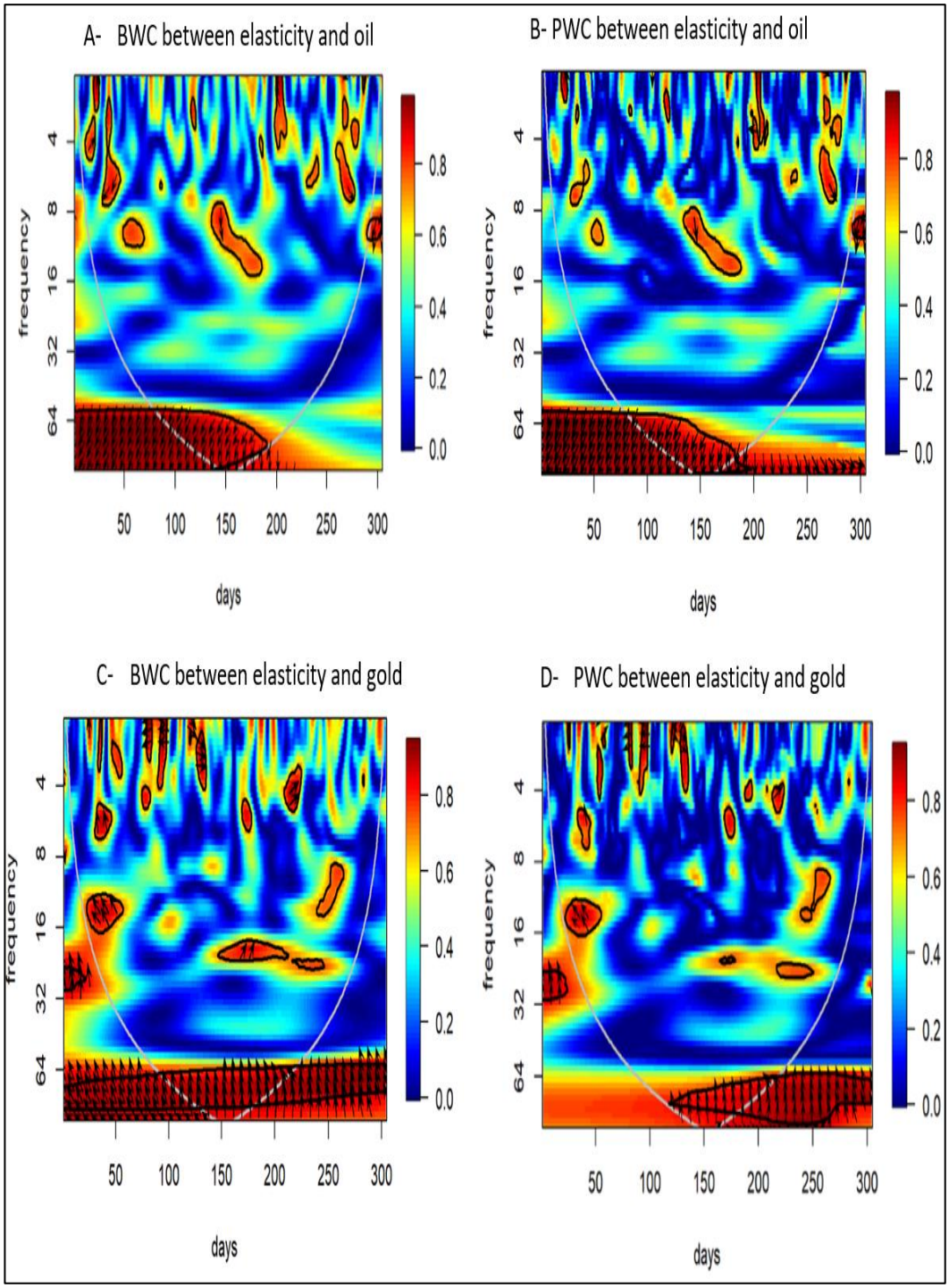

Figure 23: UAE stock market elasticity, gold, and oil co-movement maps

4.3.7 Qatari Stock Market

Qatar is an oil-exporting country. The results in Table 18 indicate that oil more than gold returns affect the elasticity of the stock market. Diebold and Yilmaz's return spillover test shows that the total connectivity factor is 1.22%, the highest among the

oil-exporting countries. However, the oil return changes the elasticity by 1.04%, whereas the gold return changes it by only 0.12%.

Table 18 Diebold and Yilmaz's test for return spillover connectedness in the Qatar stock market, oil returns, and gold returns

Variables	**Elasticity**	**Oil return**	**Gold return**	**FROM**
Elasticity	98.84	1.04	0.12	0.39
Oil return	0.96	98.80	0.23	0.40
Gold return	0.64	0.67	98.69	0.44
TO	0.53	0.57	0.12	TCI = 1.22

Table 19: Barunik and Krehlik test frequency domain spillover for the Qatar stock market, oil returns, and gold returns

Variables	**Elasticity**	**Oil return**	**Gold return**	**FROM_ABS**	**FROM_WTH**
The spillover between 1 day to 4 days.					
Elasticity	73.84	0.62	0.10	0.24	0.33
Oil return	0.65	65.14	0.20	0.28	0.40
Gold return	0.53	0.54	73.68	0.36	0.50
TO_ABS	0.39	0.39	0.10	TCI = 0.88	
To_WTH	0.55	0.54	0.14		TCI = 1.23
The spillover between 4 days to 10 days.					
Elasticity	16.07	0.25	0.01	0.09	0.50
Oil return	0.19	20.55	0.02	0.07	0.41
Gold return	0.07	0.09	16.12	0.06	0.32
FROM_ABS	0.09	0.11	0.01	TCI = 0.22	
FROM_WTH	0.50	0.65	0.07		TCI= 1.22
The spillover for more than10 days					
Elasticity	8.93	0.18	0.00	0.06	0.58
Oil return	0.12	13.11	0.01	0.04	0.41
Gold return	0.03	0.03	8.88	0.02	0.20
FROM_ABS	0.05	0.07	0.00	TCI = 0.12	
FROM_WTH	0.50	0.66	0.03		TCI = 1.20

Table 18, which presents the Barunik and Krehlik test frequency domain spillover, shows that the total connectivity factors are 1.23%, 1.22%, and 1.20% for the short, medium, and long term, respectively. Moreover, the effect of gold return is limited in the short term, only 10%. Meanwhile, the spillover oil return decreases over time but stays even in the long term.

According to Figure 24-C, gold returns are affected only during a short period, and the direction of the relationship is undetermined. However, after we exclude the effect of the pandemic, the partial wavelet test in Figure 24-D confirms the weak effect of the gold return on stock market elasticity, with the blue color taking up more space in the relationship map. Figure 24-A indicates a rapid movement between market elasticity and long-term oil returns. According to the wavelet map, the oil returns significantly started leading market elasticity at the start of 2021. Figure 24-B also confirms these results. After considering the pandemic's impact, the effect of oil remained significant in the long run during 2021. However, the results also indicate the consequential impact of the pandemic on the stock market. According to the wavelet map, the elasticity during the mid-term period did not significantly affect the oil or gold return. These results correspond with Mohanty et al. (2011) and Hamdi et al. (2019) where they showed that oil price spillover has a long-term effect on the elasticity of the Qatari stock market.

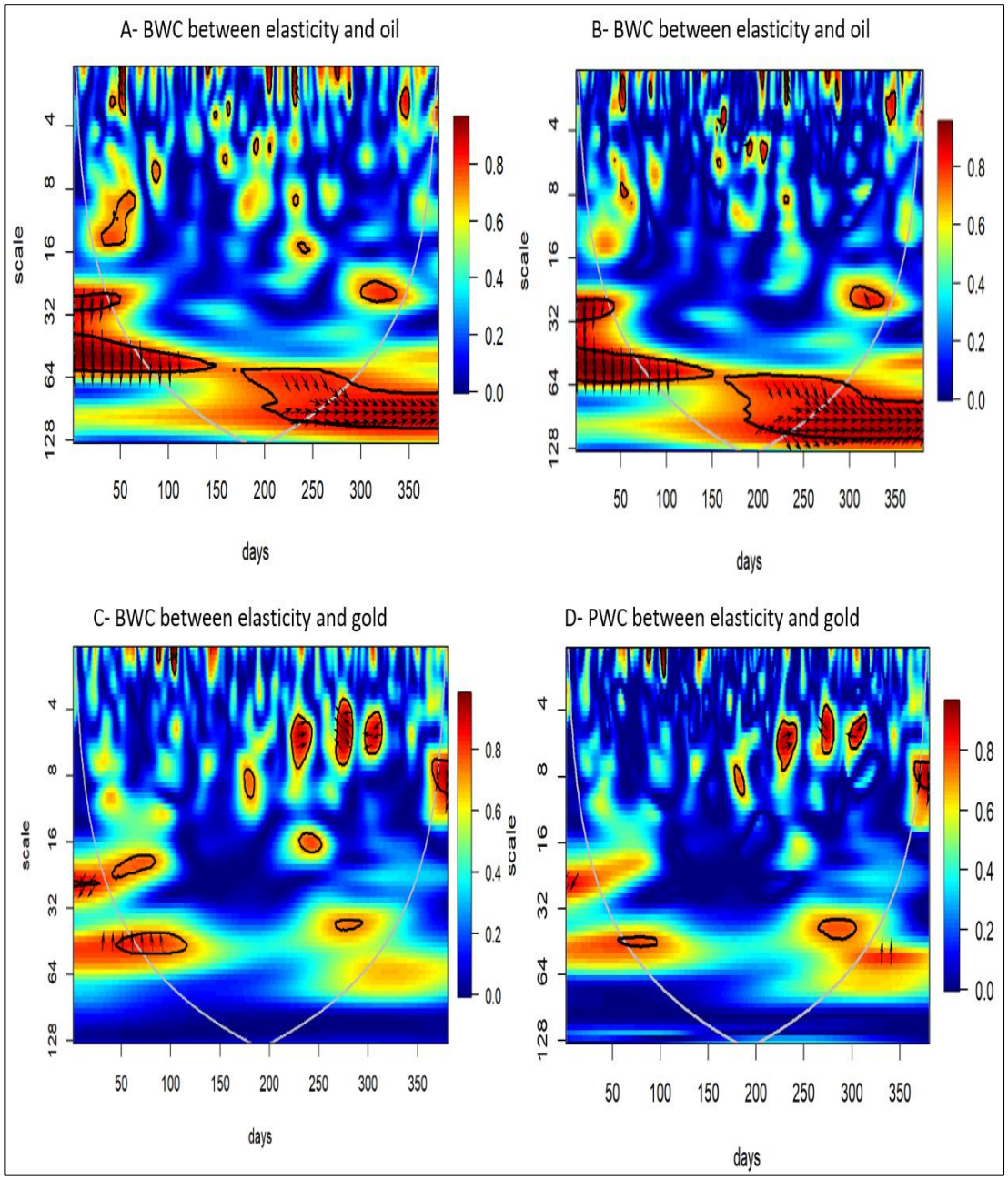

Figure 24: Qatar stock market elasticity, gold, and oil co-movement maps

4.3.8 Kuwait Stock Market

Diebold and Yilmaz's test in Table 19 indicates that the elasticity of the Kuwait stock market is mainly affected by gold return of 3.66%; oil return contributes only 0.56%. Furthermore, the total connectivity factor is 0.43%.

Table 20: Diebold and Yilmaz's test for return spillover connectedness in the Kuwait stock market, oil returns, and gold returns

Variables	**Elasticity**	**Oil return**	**Gold return**	**FROM**
Elasticity	99.19	0.59	4.13	0.27
Oil return	0.56	98.84	0.60	0.10
Gold return	3.66	0.71	95.63	0.06
TO	1.41	0.43	1.58	**TCI = 0.43**

The Barunik and Krehlik test results in Table 20 shows that the most influence of the system on elasticity occurs during the 4-to-10-day period, and both oil and gold returns have a long-term return spillover effect.

Table 21: Barunik and Krehlik test frequency domain spillover for the Kuwait stock market, oil returns, and gold returns

Variables	**Elasticity**	**Oil return**	**Gold return**	**FROM_ABS**	**FROM_WTH**
The spillover between 1 day to 4 days.					
Elasticity	75.10	0.08	0.48	0.14	0.26
Oil return	0.19	65.54	0.04	0.19	0.35
Gold return	3.07	0.41	71.64	0.96	1.75
TO_ABS	0.82	0.12	0.13	TCI = 1.30	
To_WTH	1.50	0.23	0.25		TCI = 2.38
The spillover between 4 days to 10 days.					
Elasticity	14.85	0.16	1.18	0.34	2.46
Oil return	0.15	20.29	0.08	0.09	0.69
Gold return	0.61	0.13	14.81	0.20	1.48
FROM_ABS	0.20	0.07	0.32	TCI = 0.64	
FROM_WTH	1.44	0.54	2.32		TCI= 4.71
The spillover for more than10 days					
Elasticity	8.14	0.11	0.79	0.22	0.70
Oil return	0.11	12.76	0.04	0.06	0.19
Gold Return	0.36	0.06	8.51	0.11	0.35
FROM_ABS	0.47	0.05	0.31	TCI = 0.86	
FROM_WTH	1.48	0.15	0.96		TCI = 2.70

According to Figure 25-A, there are short-term and medium-term co-movements between oil returns and the elasticity of the stock market. The rows pointing to the right downward indicate that the oil returns and the elasticity of the stock market are moving simultaneously. However, we used the partial wavelet test to exclude the effect of the pandemic on the stock market. Figure 25-B indicates that oil returns are still leading the elasticity of the stock market. The wavelet map shows that the pointers are pointing to the left and down. Gold prices have less of an effect on the elasticity of the stock market. In Figure 25-C, the map shows that the movements are out of phase and are limited to the short and medium periods. In other words, the returns of gold move first, and after a while, the elasticity follows the gold return. Figure 25-D confirms this relationship. After we exclude the effect of COVID19, the association becomes limited in the short run and the strength of the connection decreases. These results indicate that investors in the Kuwait Stock Exchange are more dependent on oil revenues than alternative investments such as gold, which may pose a risk during negative shocks in oil prices. These results are consistent with those of Ali et al. (2022), who argued that COVID-19 had changed the relation among financial market components in stock markets. According to our results, the pandemic changed the relationship among oil, gold, and stock market elasticity. The blue color prevailed over the rest of the colors after 7 January 2021, 170 days after the pandemic's outbreak in Kuwait. Finally, the Kuwait financial market results show that investors are less dependent on gold as a haven against changes in oil prices. These results are similar to those pertaining to the Bahrain financial market.

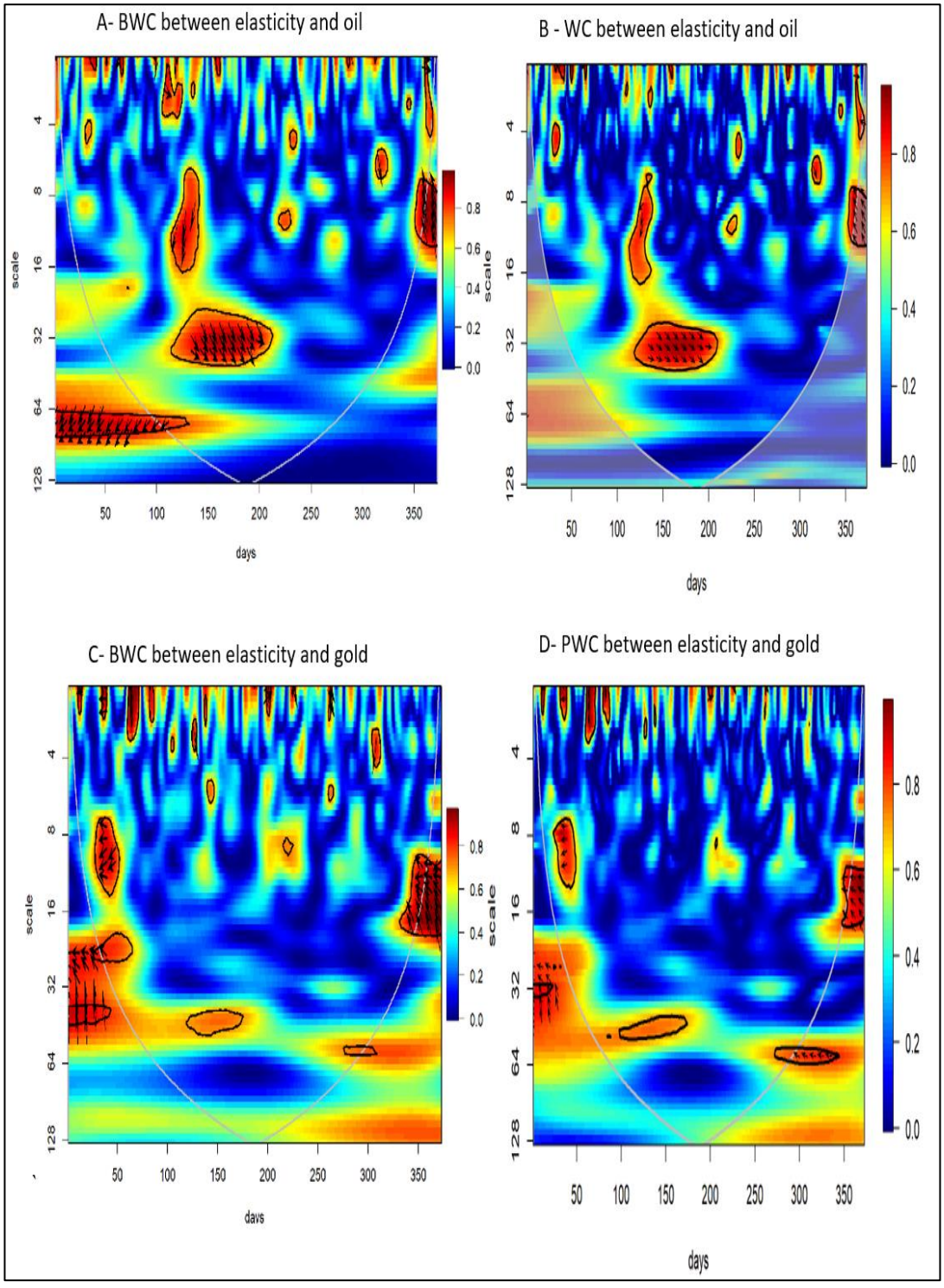

Figure 25: Kuwait stock market elasticity, gold, and oil co-movement maps

In general, the previous results agree with our study's hypotheses. The results show the varying impacts of oil price changes on stock markets in oil-exporting and oil-importing countries. Furthermore, the panic caused by the pandemic among

investors is evident in the oil and nonoil countries from the increase in demand for yellow metal (e.g., Jordan and the UAE). These impacts led to the reduction in the stock market's elasticity. Our results are consistent with those of Albulescu et al. (2021), Wei et al. (2021), and Ali et al. (2022), who argued that COVID-19 changed the effect of gold and oil on stock market performance. Moreover, the high demand for gold indicates the scale of the panic that the pandemic caused.

Chapter 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This study aimed to examine the spillover elasticity among stock markets, as well as, between oil and gold and the elasticity of stock markets for a group of countries in the Middle East. Daily data have been collected for selected of eight countries, five of which are oil exporters (Bahrain, UAE, Saudi Arabia, Kuwait, and Qatar) and three oil importers (Jordan, Egypt, and Turkey). We used Diebold and Yilmaz' (2012) and Barunik and Krehlik's (2018) tests to test the return spillover between variables. Moreover, we used the bivariate wavelet coherency test to examine the cross-correlation and co-movements among variables. We employed partial wavelet analysis to provide robust results by excluding the effect of COVID-19. The results indicated a difference in the impact of fluctuations in oil returns on the elasticity of the financial markets.

The results indicated an interaction between oil-exporting countries, while it is less for importing countries. The Saudi market is also the largest source for determining the elasticity of the Middle East markets. However, this effect is limited with short and medium period. On the other hand, the Jordanian, Turkish, and Kuwaiti markets are the most affected by the elasticity of the region's markets. Finally, the Bahraini market is considered one of the least influential financial markets on the elasticity of the region's markets. In contrast, the Egyptian and Bahraini markets interact the least with other financial markets in the Middle East. These results indicate

that the Middle East stock markets are affected by each other. Moreover, the transfer of the elasticity effect from one financial market to another indicates the interdependence of these markets and the existence of cross-border investment portfolios. In other words, if liquidity rises in the Saudi market, it will increase liquidity and demand in the rest of the region's markets, albeit for a short period. The results also show the impact of political relations on the interaction of markets, as we see the most prominent interaction between the Turkish and Qatari markets. Nevertheless, on the other hand, the interaction of the rest of the Gulf markets is weak with the Turkish market. Also, these results can be interpreted differently, as financial markets may interact similarly with external factors. For instance, the factors determining the elasticity of the Saudi stock market are somewhat similar to those affecting the Turkish market. Therefore, we find that the connectivity coefficient is high even if there is no actual investment exchange.

The elasticity in most oil-exporting countries was significantly affected by oil returns, except Saudi Arabia, which was less affected. The elasticity of the financial markets in oil-importing countries was slightly affected by oil returns, except for Egypt, which was the most responsive to changes in oil prices among the importing countries. The results also indicated the gold and oil return spillover difference in the short and long terms. For instance, the gold return spillover in the Kuwait stock market was the highest during the medium term. The oil return spillover was the highest in the Qatar stock market during the short term. These results confirm the role of the yellow metal as a hedge against the risks of change in oil prices. These results also indicate that despite the efforts of some countries to diversify their investments and reduce dependence on oil as a main source of income, oil revenues still play an important role in providing investment liquidity.

The coronavirus pandemic played a significant role in affecting the elasticity of financial markets and changing investment destinations. The study showed that investors reacted by changing their investment behavior and turning to more precautionary alternatives because of the spread of the pandemic and fears of its turning into an economic disaster. However, The response to this pandemic differed from country to country, where some stock markets reacted by hedging using gold. On the other hand, other investors resorted to investing in other alternatives.

Finally, the results differed among the sample countries, which means heterogeneity among investors in the financial markets. For example, the elasticity in the Turkish stock market did not show a significant instantaneous response to the changes in oil or gold returns. Both gold and oil returns took a while to affect the elasticity of the Turkish stock market.

5.2 Recommendations

We encourage all investors to hedge against the risks caused by the coronavirus crisis by investing in gold. However, in the case of Turkey, because the effect of changes in oil or gold returns is not instantaneous, the opportunity to gain by predicting the reaction of the Turkish stock market is greater. Furthermore, investors can take advantage of the pandemic as a temporary crisis to profit by buying oil futures contracts. Investing in gold is the best option in the short term, whereas investing in oil is the right option in the long term. Therefore, we recommend that investors make their financial portfolios more dynamic to switch between investing in oil futures and gold. Finally, given the different reactions of the financial markets in the Middle East, this disparity can be taken advantage of by investing in a cross-border investment portfolio that includes the stock markets from different countries in Middle East.

5.3 The Limitation of Dissertation

This dissertation was limited to studying the impact of the elasticity of financial markets in the Middle East region. However, it also examined the impact of both gold and oil prices in light of the corona pandemic. Therefore, varying geopolitical conditions or changing variables to other transmission measures between markets may alter the results. Generally, however, the results of this dissertation can be generalized to other financial markets bearing the characteristics of the sample markets.

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