International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2026, 16(1), 206-217.

Oil Price Shocks and Stock Market Responses: Evidence from Saudi Arabia and Spain

Hussah Adnan Alzamel, Jaizah Othman*

Department of Banking and Finance, College of Business Administration, Imam Abdulrahman Bin Faisal University, Dammam 31411, Saudi Arabia. *Email: jothman@iau.edu.sa

Received: 20 June 2025 **Accepted:** 14 October 2025 **DOI:** https://doi.org/10.32479/ijeep.21545

ABSTRACT

This research examines the time effect of oil price volatilities on the stock market performance in Saudi Arabia and Spain, which is a net oil exporter and importer, respectively. The overall data of January 2014 to June 2024 were analyzed with the autoregressive distributed lag (ARDL) model to establish short and long-term effects. The results indicate a stable positive relationship between oil prices and stock returns in Saudi Arabia, due to the high reliance of the economy to oil revenues. Spain showed a less consistent and more fluctuating connection that was a testimony to its diversified industrial structure and refined export capacity of oil. Saudi Arabia's stock market took a negative turn amidst the COVID-19 pandemic in response to the increase in oil prices, as increased uncertainty and investor distrust were witnessed, while such an increase on Spain's market took a positive shift, as the increase in oil prices is an indicator of recovery of global demand. Volatility was generally low in pre-pandemic conditions but intensified during the crisis, especially in Spain. The results highlight the asymmetric and time-varying effects of oil price shocks on exporters and importers. These findings provide useful insights for investors and policymakers seeking to manage oil-induced risks and design strategies for financial stability under both normal and crisis conditions.

Keywords: Oil Price Shocks, Stock Market Volatility, Exporter-Importer Asymmetry, Saudi Arabia, Spain, ARDL-GARCH Models
JEL Classifications: C22, E44, G15, Q43

1. INTRODUCTION

The price of oil substantially affects production expenses in firms which leads to profitability impacts and stock price performance (Lee et al., 2012; Kang and Ratti, 2013; Mokni, 2020). Stock performance becomes crucial to companies working in oil extraction since oil exists directly as an output on financial statements (El-Sharif et al., 2005; Antonakakis and Filis, 2013). The prices of oil generate direct financial effects on profitability by modifying operational expenses and market consumer trends (Tembelo and Ozyesil, 2024; Thi Huong Vuong et al., 2024). Economically oil price effects on stock market returns work through distinct channels between exporters and importers of oil (Crawford et al., 2021). Saudi Arabia strengthens corporate profits and stock market value upon oil price hikes because of the profit channel mechanism (Al-Mogren, 2020; Cevik et al., 2020). The economic growth prospects of Spain along with its stock market returns face adverse consequences because the country serves as a net importer of oil when oil prices rise (Equiza-Goñi and Perez de Gracia, 2019). The goal of this research is to establish empirical evidence about the distinct stock market performance effects from oil price changes between Saudi Arabia as an oil-exporting nation and Spain as an oil-importing country. The research explores exclusive stock return responses from oil price fluctuations within Saudi Arabia and Spain as opposites economically. The international oil producing giant Saudi Arabia derives about 42% of its GDP from oil revenue streams (Harvard Growth Lab, n.d.; Saudi Arabian Monetary Authority, 2023) together with its role as a major global oil exporter. The Spanish economy faces heightened risk from crude oil price volatility because it must import all its oil from abroad (International Energy Agency, 2023; Frías-Pinedo et al., 2017).

The research investigates how price changes in oil affect volatility in stock returns and evaluates if the pandemic altered these patterns. The analysis determines both persisting stock market return alterations through level effects together with volatility effects that demonstrate short-term deviations from standard returns. The study evaluates the oil-stock return relationship through two complementary perspectives which yield an extensive understanding of market conditions' influence (Salisu et al., 2020). This research analysis benefits various groups of stakeholders. The market volatility analysis gives investors crucial advice related to risk management strategies and portfolio diversification because investors specifically focus on sudden market movements (Sharif et al., 2020). The level effect analysis provides valuable information to policymakers and financial regulators who maintain long-term economic stability through the COVID-19 crisis to shape fiscal and energy policies (Zhang et al., 2022).

The empirical investigation depends on the ARDL model and GARCH model which analyses oil price level impacts on stock returns alongside their time-altered volatility patterns. Autoregressive Distributed Lag (ARDL) stands as an appropriate modeling technique because it detects short-term and long-term relationships alongside mixed-order integrated data, while GARCH emerges as the main tool for modeling financial time series heteroskedasticity and volatility dynamics (Salisu et al., 2020). The analysis provides important results that are significant to note. Under normal market conditions the price changes in petroleum produce a positive influence on stock price performance in Saudi Arabia as well as Spain. The COVID-19 pandemic intensified negative trends between oil exports and stock market values in Saudi Arabia since investors lost confidence due to the oil sector disruptions (Atif et al., 2022). Spain showed positive effects on oil prices throughout the pandemic period. Spain experienced a positive impact from oil price changes because its diverse economic sectors helped protect investors from adverse effects on sentiment. The increase in oil prices appeared on the market as evidence of expanding global consumption which boosted stock market capital through increased equity investment (Zhang et al., 2022).

The rest of the paper will be organized as follows. Section 2 is a review of the empirical literature on the relation in oil prices and stock market returns with respect to Saudi Arabia and Spain. Section 3 identifies major theoretical views explaining such linkages- cost, demand, and institutional factors. Section 4 gives the data, methodology (ARDL and GARCH models) and empirical findings of level and volatility effects of oil price changes. At the end of section 5, there are major insights and policy recommendations.

2. LITERATURE REVIEW

This section summarise findings from past empirical research about how oil price changes affect stock market results. The analysis integrates Saudi Arabia as an oil-exporting country with Spain as an oil-importing nation to examine their stock market performance. The research evaluation reviews statistical evidence about financial markets in both oil-importing and oil-exporting nations. The published research demonstrates that oil-importing nations experience stronger negative relations between rising oil prices and stock market value. Stock returns in the US suffer from negative implications brought by oil price volatility (Jesus et al., 2020). Joo and Park (2021) reported that stock markets show different oil price reactions depending on their current situation between economic expansion and recessive decline. Research shows that net oil-exporters typically exhibit a positive relationship between oil exports and stock market performance.

Studies have revealed that positive oil price shocks generally increase the stock market returns in the Gulf cooperation council countries, while negative shocks tend to reduce them (Nusair and Al-Khasawneh, 2018; Al-Mogren, 2020). Based on quantile regression, Nusair and Al-Khasawneh (2023) further discovered that oil-exporting countries like Canada enjoy positive stock returns emanating from an upsurge in the price of oil while oil-importing countries such as the UK and Japan have negative effects. Jouini (2013) explored in Saudi Arabia the findings of a VAR GARCH model and discovered that the oil price has a highly significant impact on the volatility of stock market that is due to the positive effects of increased firm revenues and global demand signals in this net oil-exporting economy. In a similar manner, Boukhatem and Alhazmi (2024) apply ARDL model to confirm the positive relationship existing between oil prices and stock returns in Saudi Arabia. At the same time, researchers have looked at issues affecting net oil-importing countries. The researchers found that in times of overall bullish sentiment (upper quantile), an increase by 10% of the price level of Brent crude oil will lead to an increase by 5.2% in stock price, while a similar increase would cause stock price to decline by 7.8% if conditions are bearish (lower quantile). Returns on the stock market are largely influenced by changes in exchange rates based on the specific country. Hashmi et al. (2022) revealed that there is a 4.3% change in stock prices against 1% change of exchange rates in normal market conditions and it becomes more pronounced during bearish periods showing a 6.1% difference. This enhanced perception of market stress indicates the heightened situation of the investor uncertainty and volatility.

In addition, bullish situations that witness a positive correlation between oil prices and stock market performance are also characterized due to the prices of oil increasing being used as a sign of increased global demand. Such signals enhance investor confidence and encourage them to make favorable investment decisions, enhancing positive trends on the stock market. The effectiveness of capturing these trends depends on the GARCH specification used. As compared with other variants, the ABEKK model provided superior results for volatility spillovers between oil and stock markets (Kartsonakis-Mademlis and Dritsakis, 2020). Although these results are beneficial in the research of the dynamics between exporters and importers, there are few studies that directly compared one of the largest exporters like Saudi Arabia to one of the largest importers like Spain. Theoretical channels can be tested with this comparison. The profit channel implies that increased oil revenues sustain fiscal capacity and investor attitude in exporters, whereas the cost channel implies that increased prices diminish profits and demand in importers (Basher and Sadorsky, 2006; Moya-Martínez et al., 2014). This paper avails itself of this gap by considering the two cases together in a unified structure of analysis.

Salisu et al. (2024) studied the oil price volatility-stock market return effect on an international level of the US states using monthly data. They noted that the 46 of the 50 US states had their stock markets affected by prices shocks of oil in a large manner. Ali et al. (2022) used the GARCH for studying the volatilities in India's National Stock Exchange (NSE) indices within the last 14 years (2008-2021) where they established that the shocks have long-term impacts on returns. According to Atif et al. (2022), the variation in oil prices during the pandemic saw stock markets of net oil importers being much less affected than those of net oil exporters. Similarly, Tchatoka et al. (2019) noted that turbulences in price of oil decrease actual returns from stock in importers countries while increasing them in exporters such as Norway. In addition, Kumar et al. (2021) discovered that an increase in oil prices is favorable to oil-exporter countries and increases their returns in the stock market, while hurting returns on the stock market for oil-importing countries. Escribano et al. (2023) also emphasized a tight connection between the Brent oil prices and the global equity markets, with negative co-movement in oil importers and weaker negative relationships in exporters where oil is a hedge and diversifier.

Lastly, using quantile regression on data from 10 main net oil-importing countries (Spain included), Joo and Park (2021) discovered that an increase in oil prices by 1% leads to a decrease in stock returns by around 0.5% when markets are bearish, yet that same 1% increase in oil prices raises stock returns by about 0.3% in bullish contexts. For the case of Spain, these findings imply that the stock market can enjoy a positive effect in the case where demand is high and where the market is doing well in terms of oil prices. Economic growth slumped to major levels as evidenced by considerably low demand and supply chains disruptions following a pandemic caused by COVID-19. The enhanced uncertainty at this time meant that investors and consumers adjusted their plans on their investment as well as consumption very much. As a result, the oil price may have influenced the returns of the stock market differently from what theory suggests. According to Khalfaoui et al. (2022), the stock markets were negatively affected by the COVID-19 pandemic, while, according to Atif et al. (2022), the stock markets, especially in oil-exporting countries, became more sensitive to oil prices' fluctuations during the same period. This evidence is consistent with the findings of Moyo et al. (2023), who reported increased volatility in global crude oil benchmarks, and Suripto and Supriyanto (2021), who confirmed significant declines in energy sector stock prices.

2.1. Theoretical Framework

The fluctuations in the price of oil have immediate macroeconomic effects. Unexpected shock in oil price can lead to increase in the cost of production and the latter makes profitability decline thus impacting a firm's stock market value (Kim and Vera, 2022). On the same note, an oil price increase can also be expected to negatively affect stock returns. Moreover, an increase in the price of oil may lead to outbursts of inflation that will decrease the real income of consumers and investors and will in the end diminish the volume of investments on the stock market. However, we should differentiate between those where the energy-related firms dominate, and the rest. For example, in a net oil-exporting nation such as Saudi Arabia, an increase in oil prices can have a positive effect on stock markets as a result of increasing profits in firms (Jouini, 2013). The adverse impact of rising production costs may be countered by pursuing a strategy to increase revenues to the point that the net profitability of firms would increase, coupled by an increase in their valuations of stock.

Brandimarte (2018) states that events happening in the macroeconomy can directly influence how people's opinions and moods are within the market. Thus, in general, changes in oil values lead investors to make changes in their responses based on new expectations. As an example, in an oil producing country such as Saudi Arabia, there can be a higher revenue go along with a spike on the oil price that is favorable, thus economic standing can be improved as well which can help revitalize the stock markets. On the other hand, high prices of oil impose more cost to oil-importing countries such as Spain which lowers the rate of economic growth and the value of stock return (Osah and Mollick, 2023). Therefore, oil prices are a determinant factor in the way markets behave. According to this framework, the increase in oil prices increases stock returns in net oil exporting nations but has a negative effect in net oil importing economies. But there are other ideas and assumptions we can develop based on different sets of theories. For example, as proffered by Hashmi et al. (2022), it may be possible that price rise of oil could be a no- further-need-to-say-strong indicator of demand expansion that may lead to greater investments in the stock markets of the oil importing countries. Furthermore, rising oil prices could cause stock prices in oil exporting countries to be negatively affected by interest rates. An increase in oil prices can result in higher prices for basic goods (Osah and Mollick, 2023), forcing the central bank to adjust its interest rates which makes borrowing more expensive, slows investments and impacts negatively on the economy, including the stock market (Kim and Vera, 2022). But this adverse consequence can be in a part alleviated by enhancements in fiscal balances due to higher collections of oil income (Osah and Mollick, 2023).

Studies based on Dutch disease theory can also investigate the impact of oil prices on the stock market. The theory indicates that a country's main energy resource like oil could lead to a drop in other unrelated industries as well (Alssadek and Benhin; 202; Reisinezhad, 2024). If oil prices rise, the RER in an oil-exporting country is likely to increase, making non-oil exports less attractive worldwide and resulting in these industries contracting. It can therefore be postulated that an oil price rise might cause the initial improvements in the performance of the stock market; however, over the long term however, the overall effect may turn out to be negative because the size of the non-oil sector of the economy is getting smaller. Although some works have supported the relationship between oil prices and stock in net oil exporting countries, studies conducted on the same have specifically focused on non-oil sectors not much. Such a reverse could take place in oil importing countries. First, higher oil prices may cause a slowdown of economy owing to the ever-increasing cost of business; However, in the long term oil importing of nations can have increased non-oil exports, which may contribute to the improvement in their stock market performance because of the deteriorating competitiveness of non-oil exports of oil exporting nations. As a matter of fact, regarding oil-exporting countries, literature places more emphasis on the possible positive effect of oil prices on stock market returns.

2.2. Gaps in Literature

Research on oil prices and stock markets runs extensive but scarce data exists regarding their relationship changes during the COVID-19 pandemic which brought dramatic market turbulence and disrupted supply chains and decreased demand. According to Zhang et al. (2022) and Olujobi et al. (2022) global oil prices dramatically decreased because of reduced demand alongside Saudi Arabia–Russia supply shock events. Very few studies have studied systematically how the standard market relationships that existed before the pandemic, especially the link between oil prices and stock market returns in oil-exporting countries performed during the pandemic. The research by Salisu et al. (2020) reveals that oil-exporting nations showed greater financial consequences resulting from decreased oil prices than their importing countries. The pandemic seemed to produce fundamental changes in traditional oil-stock market relationships which challenges current understanding of their mutual dependency in crises. The study examines whether the pandemic modified historical relationships between petroleum prices and stock market behaviors between nations with oil-export and import orientations.

Based on the literature review and identified research gaps, the following hypotheses are proposed:

Hypothesis 1: An increase in oil prices is expected to have a positive impact on stock market returns in Saudi Arabia, given its status as a net oil-exporting country.

For oil-importing countries such as Spain, the theoretical expectations are mixed. On one hand, higher oil prices may raise production costs, slow economic activity, and negatively affect stock market performance. On the other hand, rising oil prices could indicate stronger global demand, which may boost investor confidence and stock prices, a possibility also highlighted by Dutch disease theory. To account for these competing perspectives, this study proposes the following alternative hypotheses:

Hypothesis 2a: An increase in oil prices has a negative impact on stock market returns in Spain.

Hypothesis 2b: An increase in oil prices has a positive impact on stock market returns in Spain.

3. DATA SOURCES AND METHODOLOGY

Different sources of data were used when conducting the empirical analysis. While the data for Saudi Arabia and Spain's indexes were taken from TASI and IBEX-35, West Texas Intermediate (WTI) crude oil was found to represent global oil prices (Al-Mogren, 2020). The study used additional data such as average inflation, exchange rates EUR/USD for Spain and SAR/USD for Saudi Arabia and interest rates 3-month short-term for Saudi Arabia and long-term government bond yields for Spain which all originated from Bloomberg. The analysis focused on time between January 01, 2014, and June 28, 2024. The General Authority for Statistics (Saudi Arabia) and the National Statistics Institute (Spain) both provided the quarterly growth data on real GDP. The effect of the COVID-19 pandemic was measured with a dummy variable. Every analysis was performed through Stata software.

Several methods from econometrics were applied to assess the oil price variance's impact on stock returns in Saudi Arabia and Spain. An ARDL model was chosen since it explains short-term and long-term relationships, in its error correction (EC) form where cointegration was confirmed by means of the ARDL bounds test (Pesaran et al., 2001; Kripfganz and Schneider, 2023). The flexibility of ARDL is its flexibility with mixed-order integration, if the series are stationary (Pesaran and Shin, 1999). ADF test was used to check for the stationarity and further validation for robustness was also done with the PP test where serial correlations and heteroscedasticity are accounted (Phillips and Perron, 1988). After testing non-stationarity and generating stationary for non-stationary variables using the first difference the ARDL model was estimated. To test for autocorrelation of the residuals, this study applied the Breusch-Godfrey LM test (Baum, 2006). Finally, conditional heteroscedasticity test was done to check for the stability of error variance over time. Also, the generalized autoregressive conditional heteroskedasticity (GARCH) model was used to model stock return volatility that is determined by fluctuations of the price of oil (Bollerslev, 1986). It was to provide deeper insights about the effects of changes in the oil prices on stock returns in Spain and Saudi Arabia, that this detailed econometric approach sought to address.

4. RESULTS AND DISCUSSION

The study started with graphical investigation of the primary variables: Performance of the stock markets and price of oil. Stock market performance was measured based on the index levels and stock returns, whereas the price of oil was analyzed in regard to levels and growth rates. The first trends of the time series for TASI Index, IBEX-35 index (Spain) and the prices of crude oil are shown in Figure 1. The figure showed a positive correlation between the two variables in Saudi market. As for Spain market, it is difficult to see if the IBEX-35 index (Spain) and prices on oil are related. On the other hand, the pattern points to when prices for crude oil and the index move in the same direction. Therefore, analyzing the link between the Spanish stock market and crude oil prices is possible via a different method instead of a graph and that different method would be a multivariate analysis. As Spain imports oil, these changes could have a significant effect on the country's economy and the stock market.

The trends of stock return and percentage change in the oil price in Saudi Arabia and Spain are represented by Figure 2. The trends are the same for Saudi Arabian oil prices and stocks, both seem to grow together, though in Spain there is not much to suggest a strange pattern.

Prior to multivariate analysis, correlations between stock market indices and oil prices (Crude and Brent) were examined. Table 1 shows that the TASI index exhibits a strong positive correlation with oil prices (0.786), while the IBEX-35 index shows a weaker correlation (0.310). As stock indices are influenced by factors beyond oil prices, partial correlation estimates were also computed using an empirical model. Table 2 covers the important variables in Saudi Arabia and Spain. Since the mean and median values for Saudi Arabia's stock returns are identical and its skewness is close to or below 0.5, we can say that this type of stock distribution is almost normal. The skewness is also found to be similar in Spain's stock returns.

Table 1: Correlation estimates

Variables	TASI	IBEX 35	Oil
TASI	1.000		
IBEX 35	−0.004	1.000	
Oil	0.786	0.310	1.000

Source: Authors' estimation

4.1. Augmented Dickey-Fuller Test

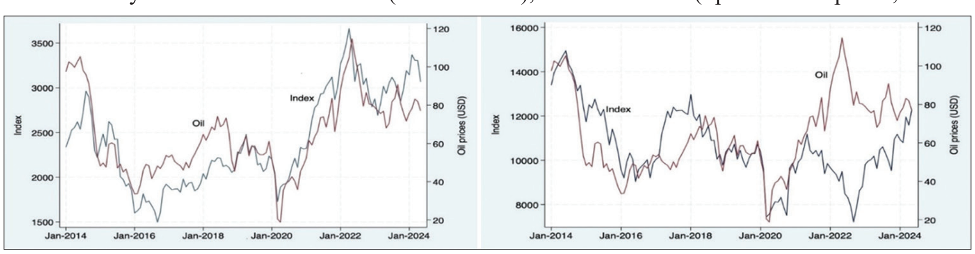
The stationarity of the variables was first examined using the Augmented Dickey-Fuller (ADF) test. The ADF test is lags sensitive. Therefore, it was possible to estimate the optimal lag length for each particular variable by the help of Akaike Information Criterion (AIC) (Bozdogan, 1987). Table 3 provides the results for Saudi Arabia and Spain. Reviewing the data and P-values from the tests for Saudi Arabia, stock returns, real GDP growth rates, percentage changes in oil prices and exchange rates are perceived to be stationary. Interest rates were detected to be unstable when observed in levels but became consistent with first-order differencing. For Spain, the ADF results in Table 3 show that stock returns, real GDP growth, and exchange rates are stationary only after first differencing, confirming that the data achieve stability once transformed.

Table 2: Summary statistics for Saudi Arabia and Spain variables

Country	Saudi Arabia						Spain					
Variables	Mean	Min.	Max.	Standard deviation	Skewness	Kurtosis	Mean	Min.	Max	Standard deviation	Skewness	Kurtosis
Stock Returns	0.004	−0.173	0.164	0.057	−0.367	3.576	0.001	−0.224	0.285	0.060	0.526	7.153
Percentage change in Oil prices	0.007	−0.542	0.884	0.132	1.775	19.264	0.007	−0.542	0.884	0.132	1.775	19.264
Interaction COVID−19	0.008	−0.542	0.884	0.112	2.993	36.147	0 0.008	−0.542	0.884	0.112	2.993	36.147
Growth Rate Real GDP	0.002	−0.049	0.044	0.010	−0.392	10.780	0.002	−0.176	0.162	0.023	−1.141	51.138
Inflation	1.641	−3.240	6.160	2.015	−0.105	3.520	1.881	−1.3	10.8	2.745	1.459	4.710
Interest rate	2.345	0.773	6.321	1.724	1.251	3.376	1.670	0.040	3.950	1.077	0.411	2.130
Exchange rate (SAR Per USD)/ (EUR Per USD)	3.751	3.750	3.764	0.002	2.857	11.947	0.882	0.721	1.020	0.058	−0.747	3.909

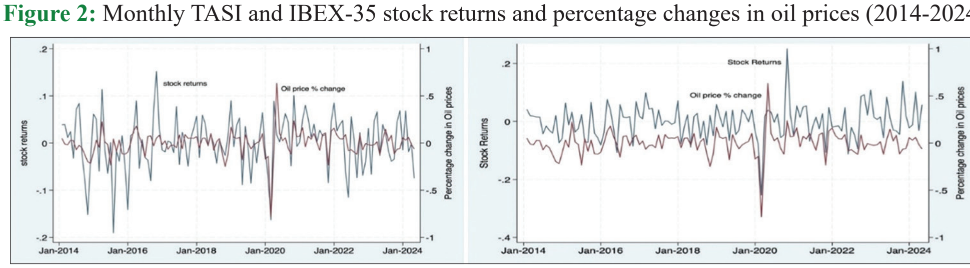
Source: Authors' estimation

Figure 1: Monthly trends in the TASI index (Saudi Arabia), IBEX-35 index (Spain and oil prices, 2014-2024)



Data Source: Bloomberg, Authors' estimation

Figure 2: Monthly TASI and IBEX-35 stock returns and percentage changes in oil prices (2014-2024)



Data Source: Bloomberg, Authors' estimation

Table 3: Results for the Augmented Dickey-Fuller (ADF) test (Saudi Arabia and Spain)

Country	Saudi Arabia				Spain			
Variables	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Optimal Lag Length	Test statistic	P -Value	Order of Integration	Optimal Lag Length	Test statistic	P -Value	Order of Integration
Stock Returns	0	−10.606***	0.000	0	0	−11.771***	0.000	
Inflation	1	−2.985**	0.036	0	4	−1.761	0.400	1
GR Real GDP	3	−4.480***	0.000	0	3	−6.509***	0.000	0
Percentage change in Oil prices	4	−5.861***	0.000	0	4	−5.861***	0.000	0
Exchange rate (SAR Per USD)/ (EUR Per USD)	1	−4.646***	0.000	0	1	−2.961*	0.039	0
Interest rate	4	−0.629	0.864	1	4	−1.343	0.609	1
Δ Interest rate	4	−3.050**	0.031	0	4	−3.881***	0.002	0

***P<0.01, **P<0.05, *P<0.1

Source: Authors' estimation

4.2. Phillips-Perron Test

To begin with, the ADF test was first used to analyze the time series variables' stationarity. To guarantee robustness, Phillips-Perron (PP) test was also used because it can handle autocorrelation and heteroscedasticity in the error terms (Phillips and Perron, 1988). As has been portrayed in Table 4, the results of the PP and ADF tests are also uniform as far as stationarity is concerned, validating the findings of the research.

4.3. ARDL Model

As shown above, all the variables meet the criterion of being stationary and stable, so the ARDL model can be applied for empirical examination. The ARDL model allows researchers to estimate the short- and long-run effects of different types of integration (Pesaran and Shin, 1999). According to Kripfganz and Schneider (2023), the error correction form of the autoregressive distributed lag (ARDL) model was chosen for two reasons. First, the cointegration of variables is shown in the following sections, so an error correction term needs to be applied. Next, this framework separates the effects that happen in the short-run from those in the long-run.

$$\begin{aligned}\Delta Stock\ Returns_t &= \beta_0 - \Upsilon_1 ECT_{t-1} + \pi_1 \Delta\%Change\,in\,Oil\ Price_t + \\ &\pi_2(\Delta\%Change\,in\,Oil\ Price_t * Covid_t) + \\ &\pi_3 \Delta Growth\ Rate\ of\ Real\ GDP_t + \pi_4 \Delta Inflation_t + \\ &\pi_5 \Delta Interest\ rate_t + \pi_6 \Delta Exchange\ Rate_t + \\ &\sum_{j=1}^{q-1} \delta_j \Delta Stock\ Returns_{t-j} + \sum_{k=1}^{r-1} \hat{o}_k \%\Delta Change\,in \\ &Oil\ Price_{t-k} + \sum_{l=1}^{s-1} \varphi_l (\Delta\%Change\,in\,Oil\ Price_{t-l} * \\ &Covid_t) + \sum_{m=1}^{t-1} \lambda_l \Delta Growth\ Rate\ of\ Real\ GDP_{t-m} + \\ &\sum_{n=1}^{u-1} \theta_c \Delta Inflation_{t-n} + \sum_{o=1}^{v-1} \alpha_h \Delta Interest\ rate_{t-o} + \\ &\sum_{p=1}^{w-1} \psi_x \Delta Exchange\ Rate_{t-p} + \omega Covid_t + u_t \qquad (1)\end{aligned}$$

Where

$$\begin{aligned}ECT_{t-1} &= Stock\ Returns_{t-1} - \rho_2 \%Change\,in\,Oil\ Price_{t-1} - \\ &\rho_3(\%Change\,in\,Oil\ Price_{t-1} * Covid_{t-1}) - \\ &\rho_4 Growth\ Rate\ of\ Real\ GDP_{t-1} - \rho_5 Inflation_{t-1} - \\ &\rho_6 Interest\ rate_{t-1} - \rho_6 Exchange\ Rate_{t-1}\end{aligned}$$

In which j, k, I, m, n, o and p represent the optimum number of lags included for stock market returns, change in oil prices, change in oil prices * COVID-19, real GDP growth rate, inflation, interest rate and exchange rate, respectively.

We would anticipate that an increase in oil prices will have a positive effect on the Saudi stock market and may have both positive and negative effects in Spain. Barring the influence of real GDP growth and exchange rates, stock returns are likely to be positively affected, but by the negative effects of inflation and interest rates. To check the difference between the pre-and post-COVID 19 crisis, an interaction item was introduced. This variable was formed by oil price variation multiplied with COVID-19 dummy therein representing the period of the pandemic. The incorporation of this term enables exploration of whether the pandemic changed price–stock return relation in oil as the economic situation and investor behavior could have influenced market reactions because of pandemic. It was also found by Salisu et al. (2020) that the pandemic's impact on the economy was higher for countries that export oil.

4.4. ARDL Results

According to Table 5, the ARDL results for Saudi Arabia point out that previous market changes impact the present market movements in the short term, where a 1% increase in past stock return leads to a 0.157% increase in stock return, (significant at the 10% level). The percentage change in oil prices is still the most prevalent long-term determinant because every 1% increase in the oil prices translates to 0.218% increase in the stock returns, as also highlighted by Alsharif (2020) and Boukhatem and Alhazmi (2024). The results herein emphasize how dependent Saudi Arabia's economy and stock market are on the oil revenues (Abdou et al., 2024; Harvard Growth Lab, *n.d.*; Saudi Arabian Monetary

Table 4: Results for the Phillips-Perron (PP) Test (Saudi Arabia and Spain)

Country	Saudi Arabia			Spain		
Variables	(1)	(2)	(3)	(1)	(2)	(3)
	Optimal Lag Length	Test statistic	P-value	Optimal Lag Length	Test statistic	P-value
Stock Rectum	0	−10.606***	0.000	0	−11.771***	0.000
Inflation	1	−2.909**	0.044	4	−1.579	0.494
Δ Inflation				4	−9.595***	0.000
GR Real GDP	3	−11.014***	0.000	3	−11.008***	0.000
Percentage change in Oil prices	4	−9.653***	0.000	4	−9.653***	0.000
Exchange rate (SAR Per USD)/(EUR Per USD)	1	−5.652***	0.000	1	−2.614*	0.090
Interest rate	4	0.214	0.973	4	−1.607	0.480
Δ Interest rate	4	−6.414***	0.000	4	−7.806***	0.000

***P<0.01, **P<0.05, *P<0.1

Source: Authors' estimation

Table 5: Results for the ARDL model (Saudi Arabia and Spain)

	Dependent variable: Δ Stock Market Returns		
Variables	Saudi Arabia		Spain
	(1)		(1)
	Model 1		Model 1
Short Run Results			
Δ Stock Market Returns$_{t-1}$	0.157*	Δ Percentage change in Oil price$_{t}$	−0.021
	(0.093)		(0.067)
Δ GR Real GDP$_{t}$	−1.404	Δ Percentage change in Oil price$_{t-1}$	0.062
	(1.143)		(0.040)
Δ GR Real GDP$_{t-1}$	−0.034	Δ Interaction COVID-19$_{t}$	0.138*
	(0.978)		(0.070)
Δ GR Real GDP$_{t-2}$	0.582	Δ GR Real GDP$_{t}$	−2.142***
	(0.750)		(0.399)
Δ GR Real GDP$_{t-3}$	0.966*	Δ GR Real GDP$_{t-1}$	−0.908***
	(0.493)		(0.315)
Δ Interest Rate$_{t}$	0.006	Δ GR Real GDP$_{t-2}$	−0.965***
	(0.027)		(0.253)
Δ Interest Rate$_{t-1}$	−0.083**	Δ GR Real GDP$_{t-3}$	−1.006***
	(0.032)		(0.174)
Δ Interest Rate$_{t-2}$	0.030	Δ Interest rate $_{t}$	−0.088***
	(0.032)		(0.022)
Δ Interest Rate$_{t-3}$	−0.061**	Δ Interest rate $_{t-1}$	0.055**
	(0.0290)		(0.025)
COVID-19	0.009	Δ Exchange rate $_{t}$ (EUR Per USD)	−1.091***
	(0.013)		(0.228)
Constant	9.336	COVID-19	0.007
	(9.358)		(0.009)
		Constant	−0.100
			(0.083)
Long Run Results			
Percentage change in Oil prices	0.218***	Percentage change in Oil prices	0.169**
	(0.055)		(0.071)
COVID-19 * percentage change in oil prices (Interaction)	−0.110* (0.063)	COVID-19 * percentage change in oil prices (Interaction)	0.000 (0.085)
GR Real GDP	1.534	GR Real GDP	2.022***
	(0.979)		(0.447)
Inflation	0.002	Inflation	−0.001
	(0.002)		(0.002)
Interest Rate	0.005	Interest rate	0.004
	(0.004)		(0.004)
Exchange rate (SAR Per USD)	−1.926	Exchange rate (EUR Per USD)	0.092
	(1.858)		(0.087)
ECT$_{t-1}$	−1.294***	ECT$_{t-1}$	−1.093***
	(0.133)		(0.078)
Observations	115	Observations	118
R-squared	0.669	R-squared	0.820

***P<0.01, **P<0.05, *P<0.1

Source: Authors' estimation

Authority, 2023), where the income effect alone causes the firm profits and market valuations to expand with the changing oil prices (Jouini, 2013). The results agree with the existing studies, which found the positive relationship between the oil prices and performance of the stock market in oil-exporting countries (Nusair and Al-Khasawneh, 2018).

However, during the COVID-19 pandemic, a positive effect on the oil price had a negative impact on stock returns, and this could have been caused by increased uncertainty in the market and low investors' sentiments as observed by Salisu et al. (2020) and Sharif et al. (2020). This means that the impact of global shocks on oil-exporting economies had been worsened by the pandemic. However, in the short period, the delayed investors' reaction to economic recovery signals positively influenced stock returns. Also, first and third lagged interest rate variation adversely influenced stock returns (Kim and Vera, 2022; Osah and Mollick, 2023). The statistically significant and negative error correction term which is from −1.5 to 0 confirms the speedy correction of deviations from temporary to long-run equilibrium within about 23 days as previously reported by Narayan and Smyth (2006) and Hou et al. (2024).

Table 5 also shows the ARDL results for Spain. In the short run, a negative, but statistically insignificant effect of oil prices on stock returns can be found, whereas lagged oil price changes positively affect the stock returns, but in a statistically insignificant way too. However, as far as the COVID-19 pandemic is concerned, price increases of oil have positive and statistically significant effects on the functioning of stock markets. This goes along with observations that Spain's stock market had tumbled precipitously once the pandemic began, only to revive dramatically as the global demand improved and restrictions were lifted. The increase in the market price of oil was most probably a positive sign to investors that the economy had begun to pick and thus encouraged them to join in the market activity. Although this effect was only temporary, long-run outcomes demonstrated a strong and significant positive association between prices for oil and stock returns confirming H2b hypothesis.

In theory, the increase in the price of oil can deflate stock markets due to higher production cost or boost it because higher price of oil suggests stronger demand and economic activity (Filis et al., 2011). When it comes to Spain, it is apparent that the positive demand-driven effect is a leading one. Moya-Martínez et al. (2014) also determined a positive link from Spanish stock returns to oil prices from 1993 to 2010 that they explained by the international demand growth. In the oil-importing Pakistan, Hashmi et al. (2022) also indicated a positive relationship between the oil-stock return and availability of stocks. In addition, Spain has eight refineries which produce a surplus of refined oil to export (International Energy Agency, 2023) and can partially account for the long-term positive stock market reaction. The composition of IBEX-35 could also be another contributing factor since seven giant renewable energy companies contribute 21.84% of the market capitalization. With increasing oil prices, demand for alternative sources of energy increases, which can in turn stimulate demand for stocks within the renewable sector. The stock returns and the real GDP growth relationship were mixed. Short-run growth in GDP was negatively correlated with stock market returns, and the long-term impact was positive and statistically significant, as consistent with the belief that long-term economy enhances market performance. It does not seem intuitive, but the short-run negative association reverberates Fama's (1981) analysis, suggesting that robust GDP growth could precede investor expectations of slowing down the economies.

The impact of interest rates on the stock returns in Spain was not conclusive. Rising short-term interest rates lowered stock values initially, but followed by positive reaction with one lag periods, which indicates transitory pressures on initial borrowing costs that stabilized later, reflecting the findings of Shaw (2022) described sectoral variation in the interest rate sensitivity. The long-term effect was not significant. A negative short-term effect for exchange rates was observed which may be attributed to depreciation of currency and capital flight causing investors' caution. A long-term exchange rate effect could not be detected. Finally, the model estimated a negative and statistically significant error correction term, according to which the deviations from long-run equilibrium are to be eliminated during roughly 0.91 months (27 days). This is consistent with the previous studies (Narayan and Smyth, 2006; Hou et al., 2024). There was a significant fit as the overall model explained 82% of how stock returns are determined ($R^2 = 0.82$).

4.5. Diagnostic Test for Autocorrelation and Cointegration

Autocorrelation in the residuals was tested using the Breusch-Godfrey LM test, as ARDL estimates are inefficient under serial correlation (Baum, 2006). It was shown that for all lag lengths, P-values were >0.10 and, hence, null hypothesis of no autocorrelation was not rejected. In addition to the above test, ARDL bounds test for cointegration was carried out to establish the existence of a long-term relationship existing between the dependent and explanatory variables (Pesaran et al., 2001). Based on F- and T-statistics, the null hypothesis of no cointegration was rejected, implying that the coexistence of variables in the long run was stable, despite possibly having nonstationarity at different levels. These findings provide more reason to work with the ARDL model that has an error correction term.

4.6. Testing for Conditional Heteroscedasticity

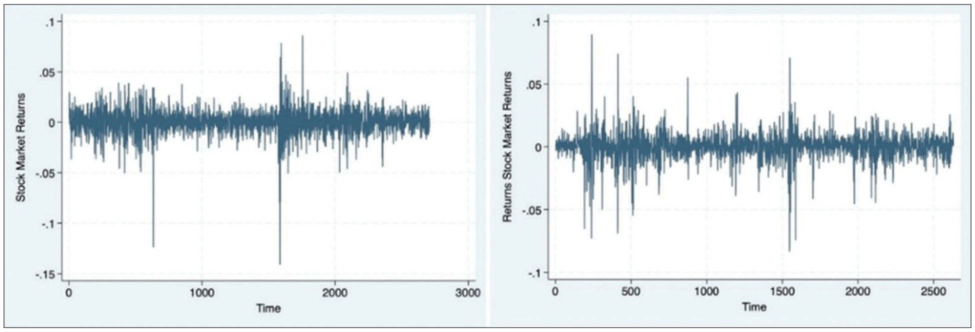
The ARDL model was first used to investigate the level effects of oil price changes and so many other variables on stock returns. To continue on the volatility of stock returns, the data at. daily level were considered because volatility is normally more evident at a higher frequency. From the graphical observation of the trends of the stock returns (Figure 3) it seems to indicate the presence of heteroscedasticity. To confirm it statistically the ARCH LM test was conducted.

Null Hypothesis (H_0): There are no ARCH effects in the residuals (i.e. the residuals are homoscedastic).

Alternative Hypothesis (H_1): There are ARCH effects in the residuals (i.e. the residuals are heteroscedastic).

As Table 6 displays, null hypothesis was rejected at all lag distances with overwhelmingly large chi squared values, and

Figure 3: Daily reruns of the saudi stock market and spanish stock market



Data source: Bloomberg, Authors' estimation

Table 6: Results for the ARCH LM test (Saudi Arabia and Spain)

Lags (p)	Saudi		Spain	
	Chi-squared value	P-value	Chi-squared value	P-value
1	361.227	0.000	44.125	0.000
2	479.450	0.000	138.202	0.000
3	486.535	0.000	278.797	0.000
4	494.237	0.000	282.129	0.000
5	506.979	0.000	284.767	0.000
6	508.979	0.000	285.012	0.000
7	510.990	0.000	285.976	0.000
8	511.913	0.000	313.061	0.000
9	516.379	0.000	315.011	0.000
10	517.286	0.000	315.314	0.000
11	517.122	0.000	315.252	0.000
12	519.066	0.000	315.183	0.000
13	521.933	0.000	315.173	0.000
14	523.744	0.000	315.038	0.000
15	524.441	0.000	314.973	0.000

Source: Authors' estimation

very small P-values, indicating significant volatility within the dependent variable.

4.7. GARCH Model

Our dependent variable, the stock returns, shows considerable volatility, which prompts us to estimate a GARCH model. The GARCH model enables modelling volatility in the dependent variable and identifies any inertia during the periods of high and low levels of volatility. We anticipate volatility in the data during periods of economic instability, such as the COVID-19 pandemic (Setiawan et al., 2021). Equation 2 below estimates the mean return equation using the ARCH-in-mean, which is particularly useful in the context of a trade-off between the risk and return of an asset (Zhao et al., 2024).

$$Stock\ Returns_t = +\psi_t^2 + \varepsilon_t \quad (2)$$

Equation (2) has stock returns ($Stock\ Returns_t$) as the dependent variable, explained by the constant mean return (μ), the conditional variance (σ_t^2) and an error term (ε_t). We expect (ψ) to be positive since the higher risk is expected to increase the asset returns. The conditional variance (σ_t^2) using GARCH (1,1) is modelled as below:

$$\sigma_t^2 = +\sigma\varepsilon_{t-1}^2 + \beta\sigma_{t-1.}^2 \quad (3)$$

Note that (σ_t^2), which captures volatility clustering, is derived from the conditional variance of the error term (ε_t) in equation (2). (ω) is the intercept, and the parameter (α) measures the impact of past squared residuals (ε_{t-1}^2) on current volatility. The parameter (β) detects any underlying inertia in the asset volatility. The presence of volatility clustering is indicated by the size of ($\alpha + \beta$). If ($\alpha + \beta$) are >0, which suggests a trend in volatility where large and small variations are followed by similar-sized variations respectively. Further, this sum must be <1 to ensure the stability of the model.

Equation (3) is further augmented by adding the main control variables which are oil price changes, a dummy for covid pandemic period and their interaction term. This last variable enables identifying whether the impact of oil price changes on volatility was different during the Covid-19 period as compared to the other period.

$$\sigma_t^2 = \omega + \sigma\varepsilon_{t-1}^2 + \beta\sigma_{t-1}^2 + \delta_m Covid_t + \phi_k \%\,Change\,in\,Oil\,Price_t + \varphi_j(\%\,Change\,in\,Oil\,Price_t * Covid_t) \quad (4)$$

In Equation (4), the parameter δ_m should be positive, which is the indication of the increased market uncertainty and stock return volatility in the COVID-19 pandemic. As well, ϕ_k is postulated to be positive for Saudi Arabia and Spain too. The ARDL results indicate that a rise in oil prices leads to higher performance on the stock market in both countries. As has been done in previous studies such as Jouini (2013) which associated high oil prices with increased volatility of stock prices, the fluctuations in the prices of oil are expected to have a positive impact on the returns of stock markets.

4.8. GARCH (1,1) Results

The COVID-19 pandemic did not have a significant effect on stock return volatility, which agrees with Wasiuzzaman (2022). However, in the pre-pandemic period, the increase in the prices of oil had a drastic effect on return volatility. A positive, but lesser magnitude of interaction term buffered this effect in the pandemic time, but the relationship was still negative. This indicates the nature of Saudi Arabia as a net oil exporter, and when the prices of oil go up, they tend to stabilize markets by sending an economic

Table 7: Results for the GARCH (1,1) Model

Country	(1)	(2)
	Saudi	Spain
Conditional Mean equation		
μ	0.001*	0.000
	(0.000)	(0.000)
σ_t^2	-0.308	2.638
	(4.06)	(2.698)
Conditional Variance equation		
ω	-11.891***	-12.023***
	(0.183)	(0.163)
COVID-19	-0.306	0.301**
	(0.232)	(0.136)
% Change in Oil prices	-51.520***	-38.151***
	(4.942)	(5.263)
% Change in Oil prices*	50.424***	37.074***
COVID-19	(5.122)	(5.370)
α Arch effect	0.250***	0 0.128***
	(0.019)	(0.010)
β Grach effect	0.628***	0.813***
	(0.014)	(0.015)
$(\alpha+\beta)$	0.878	0.941

***P<0.01, **P<0.05, *P<0.1
Source: Authors' estimation

signal of prowess. The increased uncertainty and investor's skepticism in the pandemic, however, probably pushed the high price volatility despite the increasing price of oil. The present study, to the best of authors' knowledge, provides an empirical perspective on the effect of the oil prices on stock return volatility in Saudi Arabia during the COVID-19 period. Based on the results on Table 7, both α (0.250) and β (0.628) were significant from statistical point of view and indicate the persistence in the past shocks and volatility. There was indeed existence of volatility clustering, but the $\alpha + \beta < 1$ proved mean reversion to a long-term average (Chaudhary et al., 2020).

Spain's change in stock return volatility due to higher oil prices in the COVID-19 era could be due to investor optimism that these increases would accelerate the recovery (Moya-Martínez et al., 2014). However, after the pandemic, the effect became positive. This change can be explained by the country's economic structure that is highly dependent on tourism -a significantly disturbed sector by the pandemic thus escalating economy and stock market risk (Carrillo-Hidalgo et al., 2023). These results fit the claims made by Basuony et al. (2022) who also observed enhanced market sensitivity under such circumstances. The ARCH and GARCH effects were statistically significant indicating that there was volatility clustering even though the sum $\alpha + \beta < 1$, this means that volatility is a mean reverting, and it was not out of this world increasing uncontrollably (Ahmed et al., 2018).

5. CONCLUSION AND RECOMMENDATIONS

This study examines the relationship between oil prices and stock market returns in Saudi Arabia and Spain over the period from January 2014 to June 2024, utilizing the Autoregressive Distributed Lag (ARDL) model for empirical analysis. The analysis of stock return volatility was continued with the help of the GARCH (1,1) model. For Saudi Arabia, the present analysis examined whether high oil prices, as one of the main sources of revenues in this net oil-exporting country, lead to greater corporate profitability and stock market performance. For Spain, this was a case of a net importer of oil for which two opposing hypotheses were tested: the increase in the price oil could either adversely affect stock returns or positively in some market situations.

On the other hand, Hashmi et al. (2022) also highlighted the fact that the increase in oil prices can be a signal of an improvement and an increase in demand within the economy hence an avenue for attracting more investment in stocks. It is predicted that an increase in oil prices will cause either positive or negative returns on the stock market. The findings show that increased oil prices help in higher stock returns in Saudi Arabia (Al-Mogren, 2020). In Spain, there are both positive and negative results, including sectoral variations in the impact of oil shocks (Moya-Martínez et al., 2014), time-varying bi-directional causality (Jammazi et al., 2017), and studies that find that oil shocks tend to have a depressive effect on the returns of oil-importing markets (Park and Ratti, 2008; Cuñado and Pérez de Gracia, 2014). However, a negative effect is noted in Saudi Arabia during COVID-19 period. The pandemic triggered considerable market uncertainty and serious drop in the world's demand, resulting in increased investor pessimism in the Saudi oil dependent economy (Moyo et al., 2023; Suripto and Supriyanto, 2021). Consequently, the rise in oil prices did not translate to better market performance because there was low investor sentiment. In the second part of the empirical analysis, volatility in stock returns had been modelled with the result that higher oil prices were linked to lower volatility in stock returns. Nevertheless, during COVID-19 oil price growth was associated with greater volatility. Also, volatility clustering is also observed but not of the explosive type in either case.

Future research should distinguish demand from supply shocks with structural methods, test asymmetric effects of oil price changes using QARDL or EGARCH, and extend the analysis to sector and firm-level differences to reveal how risks are redistributed across the economy. From a Saudi perspective, future work should also examine how fiscal policy adjustments and diversification efforts under Vision 2030 influence the transmission of oil shocks to stock market performance. From a Spanish perspective, future studies should assess how the country's refining capacity, renewable energy expansion, and reliance on imported oil shape the resilience of its stock market to global oil price fluctuations

REFERENCES

Abdou, H.A., Elamer, A.A., Abedin, M.Z., Ibrahim, B.A. (2024), The impact of oil and global markets on Saudi stock market predictability: A machine learning approach. Energy Economics, 132, 107416.

Ahmed, R.R., Veinhardt, J., Streimikiene, D., Channar, Z.A. (2018), Mean reversion in international markets: Evidence from G.A.R.C.H. and half-life volatility models. Economic Research-Ekonomska Istrazivanja, 31(1), 1198-1217.

Ali, F., Suri, P., Kaur, T., Bisht, D. (2022), Modelling time-varying volatility using GARCH models: Evidence from the Indian stock market. F1000 Research, 11, 1098.

Al-Mogren, N.B.A. (2020), The impact of oil price fluctuations on Saudi

Arabia stock market: A vector error-correction model analysis. International Journal of Energy Economics and Policy, 10(6), 310-317.

Alsharif, M. (2020), The relationship between the returns and volatility of stock and oil markets in the last two decades: Evidence from Saudi Arabia. International Journal of Economics and Financial Issues, 10(4), 1-8.

Alssadek, M., Benhin, J. (2021), Oil boom, exchange rate and sectoral output: An empirical analysis of Dutch disease in oil-rich countries. Resources Policy, 74, 102362.

Antonakakis, N., Filis, G. (2013), Oil prices and stock market correlation: A time-varying approach. International Journal of Energy and Statistics, 1(1), 17-29.

Atif, M., Raza Rabbani, M., Bawazir, H., Hawaldar, I.T., Chebab, D., Karim, S., AlAbbas, A. (2022), Oil price changes and stock returns: Fresh evidence from oil exporting and oil importing countries. Cogent Economics and Finance, 10(1), 2018163.

Basher, S.A., Sadorsky, P. (2006), Oil price risk and emerging stock markets. Global Finance Journal, 17(2), 224-251.

Basuony, M.A.K., Bouaddi, M., Ali, H., EmadEldeen, R. (2022), The effect of COVID-19 pandemic on global stock markets: Return, volatility, and bad state probability dynamics. Journal of Public Affairs, 22(S1), 2761.

Baum, C. (2006), An Introduction to Modern Econometrics using Stata. Texas, USA: Stata Press.

Bollerslev, T. (1986), Generalized autoregressive conditional heteroskedasticity. Journal of Econometrics, 31(3), 307-327.

Boukhatem, J., Alhazmi, A.M. (2024), COVID-19 pandemic, oil prices and Saudi stock market: Empirical evidence from ARDL modeling and Bayer-Hanck cointegration approach. Future Business Journal, 10(1), 58.

Bozdogan, H. (1987), Model selection and Akaike's information criterion (AIC): The general theory and its analytical extensions. Psychometrika, 52(3), 345-370.

Brandimarte, P. (2018), An introduction to financial markets: A quantitative approach. John Wiley and Sons.

Carrillo-Hidalgo, I., Pulido-Fernández, J.I., Durán-Román, J.L., Casado-Montilla, J. (2023), COVID-19-19 and tourism sector stock price in Spain: Medium-term relationship through dynamic regression models. Financial Innovation, 9(1), 8.

Cevik, E.I., Al-Eisa, E.A., Dibooglu, S., Awad Abdallah, A. (2020), Oil prices, stock market returns, and volatility spillovers: Evidence from Saudi Arabia. International Economics and Economic Policy, 18(1), 157-175.

Chaudhary, R., Bakhshi, P., Gupta, H. (2020), Volatility in international stock markets: An empirical study during COVID-19-19. Journal of Risk and Financial Management, 13(9), 208.

Crawford, S., Markarian, G., Muslu, V., Price, R. (2021), Oil prices, earnings, and stock returns. Review of Accounting Studies, 26(1), 218-257.

Cuñado, J., Pérez de Gracia, F. (2014), Oil price shocks and stock market returns: Evidence for some European countries. Energy Economics, 42, 365-377.

El-Sharif, I., Brown, D., Burton, B., Nixon, B., Russell, A. (2005), Evidence on the nature and extent of the relationship between oil prices and equity values in the UK. Energy Economics, 27(6), 819-830.

Equiza-Goñi, J., Perez de Gracia, F. (2019), Impact of state-dependent oil price on US stock returns using local projections. Applied Economics Letters, 26(11), 919-926.

Escribano, A., Koczar, M.W., Jareño, F., Esparcia, C. (2023), Shock transmission between crude oil prices and stock markets. Resources Policy, 83, 103754.

Fama, E. (1981), Stock returns, real activity, inflation, and money. American Economic Review, 71(4), 545-565.

Filis, G., Degiannakis, S., Floros, C. (2011), Dynamic correlation between stock market and oil prices: The case of oil-importing and oil-exporting countries. International Review of Financial Analysis, 20(3), 152-164.

Frías-Pinedo, I., Díaz-Vázquez, R., Iglesias-Casal, A. (2016), Oil prices and economic downturns: The case of Spain. Applied Economics, 49(16), 1637-1654.

Harvard Growth Lab. (n.d), Country Profile: Saudi Arabia. Center for International Development at Harvard University. Available from: https://atlas.cid.harvard.edu

Harvard Growth Lab. (n.d.), Growth Lab. Available from: from https://growthlab.hks.harvard.edu/applied-research/saudi-arabia

Hashmi, S.M., Chang, B.H., Huang, L., Uche, E. (2022), Revisiting the relationship between oil prices, exchange rate, and stock prices: An application of quantile ARDL model. Resources Policy, 75, 102543.

Hou, Y., Li, X., Wang, H., Yunusova, R. (2024), Focusing on energy efficiency: The convergence of green financing, FinTech, financial inclusion, and natural resource rents for a greener Asia. Resources Policy, 93, 105052.

International Energy Agency. (2023), Spain: Energy Profile 2023. Available from: https://www.iea.org/countries/spain

International Energy Agency. (2023), Spain: Oil Security Policy. Available from: https://www.iea.org/articles/spain-oil-security-policy [Last accessed on 2024 Aug 31].

Jammazi, R., Ferrer, R., Jareño, F., Shahzad, S.J.H. (2017), Time-varying causality between crude oil and stock markets: What can we learn from a multiscale perspective? International Review of Economics and Finance, 49, 453-483.

Jesus, D., Bezerra, B.F.L.S., Besarria, N.C. (2020), The non-linear relationship between oil prices and stock prices: Evidence from oil-importing and oil-exporting countries. Research in International Business and Finance, 54, 101229.

Joo, Y.C., Park, S.Y. (2021), The impact of oil price volatility on stock markets: Evidences from oil-importing countries. Energy Economics, 101, 105413.

Jouini, J. (2013), Return and volatility interaction between oil prices and stock markets in Saudi Arabia. Journal of Policy Modeling, 35(6), 1124-1144.

Kang, W., Ratti, R.A. (2013), Oil shocks, policy uncertainty and stock market returns. Journal of International Financial Markets, Institutions and Money, 26, 305-318.

Kartsonakis-Mademlis, D., Dritsakis, N. (2020), Does the choice of the multivariate GARCH model on volatility spillovers matter? Evidence from oil prices and stock markets in G7 countries. International Journal of Energy Economics and Policy, 10(5), 164-182.

Khalfaoui, R., Solarin, S.A., Al-Qadasi, A., Ben Jabeur, S. (2022), Dynamic causality interplay from COVID-19-19 pandemic to oil price, stock market, and economic policy uncertainty: Evidence from oil-importing and oil-exporting countries. Annals of Operations Research, 313, 105-143.

Kim, G., Vera, D. (2022), The effect of oil price fluctuation on the economy: What can we learn from alternative models? Journal of Applied Economics, 25(1), 856-877.

Kripfganz, S., Schneider, D.C. (2023), ARDL: Estimating autoregressive distributed lag and equilibrium correction models. Stata Journal, 23(4), 983-1019.

Kumar, S., Khalfaoui, R., Tiwari, A.K. (2021), Does geopolitical risk improve the directional predictability from oil to stock returns? Evidence from oil-exporting and oil-importing countries. Resources Policy, 74, 102253.

Lee, B.J., Yang, C.H., Huang, B.N. (2012), Oil price movements and stock markets revisited: A case of sector stock price indexes in the G7 countries. Energy Economics, 34(5), 1284-1300.

Mokni, K. (2020), Time-varying effect of oil price shocks on the stock market returns: Evidence from oil-importing and oil-exporting countries. Energy Reports, 6, 605-619.

Moya-Martínez, P., Ferrer-Lapeña, R., Escribano-Sotos, F. (2014), Oil price risk in the Spanish stock market: An industry perspective. Economic Modelling, 37, 280-290.

Moyo, C., Anyikwa, I., Phiri, A. (2023), The Impact of covid-19 on oil market returns: Has market efficiency being violated? International Journal of Energy Economics and Policy, 13(1), 118-127.

Narayan, P., Smyth, R. (2006), What determines migration flows from low-income to high-income countries? An empirical investigation of Fiji-U.S. migration 1972-2001. Contemporary Economic Policy, 24, 332-342.

Nusair, S.A., Al-Khasawneh, J.A. (2018), Oil price shocks and stock market returns of the GCC countries: Empirical evidence from quantile regression analysis. Economic Change and Restructuring, 51(4), 339-372.

Nusair, S.A., Al-Khasawneh, J.A. (2023), Changes in oil price and economic policy uncertainty and the G7 stock returns: Evidence from asymmetric quantile regression analysis. Economic Change and Restructuring, 56(3), 1849-1893.

Olujobi, O.J., Olarinde, E.S., Yebisi, T.E., Okorie, U.E. (2022), COVID-19 pandemic: The impacts of crude oil price shock on Nigeria's economy, legal and policy options. Sustainability, 14(18), 11166.

Osah, T.T., Mollick, A.V. (2023), Stock and oil price returns in international markets: Identifying short and long-run effects. Journal of Economics and Finance, 47(1), 116-141.

Park, J., Ratti, R.A. (2008), Oil price shocks and stock markets in the U.S. and 13 European countries. Energy Economics, 30(5), 2587-2608.

Pesaran, M.H., Shin, Y. (1999), An autoregressive distributed-lag modelling approach to cointegration analysis. In: Strøm, S., editor. Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium. Cambridge University Press. p371-413.

Pesaran, M.H., Shin, Y., Smith, R.J. (2001), Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3), 289-326.

Phillips, P.C.B., Perron, P. (1988), Testing for a unit root in time series regression. Biometrika, 75(2), 335-346.

Reisinezhad, A. (2024), The Dutch disease revisited: Consistency of theory and evidence. Environmental and Resource Economics, 87(3), 553-603.

Salisu, A.A., Ebuh, G.U., Usman, N. (2020), Revisiting oil-stock nexus during COVID-19-19 pandemic: Some preliminary results. International Review of Economics and Finance, 69, 280-294.

Salisu, A.A., Gupta, R., Cepni, O., Caraiani, P. (2024), Oil shocks and state-level stock market volatility of the United States: A GARCH-MIDAS approach. Review of Quantitative Finance and Accounting, 63, 1473-1510.

Saudi Arabian Monetary Authority. (2023), Annual Report 2023. Available from: https://www.sama.gov.sa

Setiawan, B., Ben Abdallah, M., Fekete-Farkas, M., Nathan, R.J., Zeman, Z. (2021), GARCH (1,1) models and analysis of stock market turmoil during COVID-19 outbreak in an emerging and developed economy. Journal of Risk and Financial Management, 14(12), 576.

Sharif, A., Aloui, C., Yarovaya, L. (2020), COVID-19 pandemic, oil prices, stock market, geopolitical risk and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach. International Review of Financial Analysis, 70, 101496.

Shaw, D.E. (2022), Divergent interests: Interest rate sensitivity in the cross-section of stock returns. CAIA Association. Available from: https://caia.org/blog/2022/11/16/divergent-interests-interest-rate-sensitivity-cross-section-stock-returns

Suripto, S., Supriyanto, S. (2021), The Effect of the COVID-19 pandemic on stock prices with the event window approach: A case study of state gas companies, in the energy sector. International Journal of Energy Economics and Policy, 11(3), 155-162.

Tchatoka, F.D., Masson, V., Parry, S. (2019), Linkages between oil price shocks and stock returns revisited. Energy Economics, 82, 42-61.

Tembelo, T., Ozyesil, M. (2024), Oil price shocks and stock markets: Evidence from oil-exporting and oil-importing countries. International Journal of Energy Economics and Policy, 14(2), 222-231.

Thi Huong Vuong, G., Nguyen, M.H., Hoang, K. (2024), Oil price uncertainty, oil pricing reform, and corporate profitability: The case of China. PLoS One, 19(2), e0297554.

Wasiuzzaman, S. (2022), Impact of COVID-19 on the Saudi stock market: Analysis of return, volatility and trading volume. Journal of Asset Management, 23(4), 350-363.

Zhang, D., Hu, M., Ji, Q. (2022), Financial markets under the global pandemic of COVID-19. Finance Research Letters, 38, 101528.

Zhang, N., Wang, A., Ul-Haq, N., Nosheen, S. (2022), The impact of COVID-19-19 shocks on the volatility of stock markets in technologically advanced countries. Economic Research-Ekonomska Istraživanja, 35(1), 2191-2216.

Zhao, P., Zhu, H., Siu Hung, N.G.W., Lee, D.L. (2024), From GARCH to neural network for volatility forecast. Proceedings of the AAAI Conference on Artificial Intelligence, 38(15), 16998-17006.