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The Effect of the Israel–HAMAS War on Stock Returns: An Event Study Approach

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Introduction

Before the commencement of the Israel–HAMAS war, the world economy was already facing many difficulties due to the Russia–Ukraine war, including an increase in food prices – mainly stemming from interrupted grain exports from Ukraine – and an increase in petroleum prices caused by high demand and restricted oil supply.

Tension between Jews and Palestinian Arabs increased when the Balfour Declaration was issued in 1917 to establish a 'national home' for Jews in Palestine. Since *Al Nakba*, the ethnic cleansing in 1948, which involved hundreds of thousands of Palestinians being forced to flee their homes, there have been persistent conflicts and strains in the area. Ultimately, HAMAS's attack on Israel on 7 October 2023, prompted a military response from the Israeli Defense Forces (IDF), leading to an invasion of the Gaza Strip. The shock attack launched on Israel raised fears of a conflict escalating and the disruption of oil and gas exports, as the fighting region contains a large portion of the world's petroleum resources. In 2022, about 56% of the world's known oil reserves were located in the Middle East (Statista Research Department, 2024a). Prices were pushed up by 10%, reaching $93 a barrel; however, they returned to a level lower than at the beginning of the war as early as November.

As a result of growing globalisation, events like wars, conflicts, economic downturns, and environmental emergencies impact financial markets globally and regionally. The main objective of this research is to investigate the impact of the ongoing war between Israel and HAMAS on prices of commodities like oil, using the event study methodology.

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Does the event – the Israel–HAMAS war that occurred in the Middle East – have an impact on the returns of oil corporations? This is the primary research question. The main hypothesis states that the Israel–HAMAS war significantly impacts the behaviour of oil-related companies' stock returns.

Daily data from January 2022 to December 2023 – the period before and during the war – are included in the report to calculate the abnormal returns for the largest publicly traded oil-related companies on the NYSE using the *average return model.* This study adds to the body of literature by examining a topic that has not yet been widely researched. To the best of the author's knowledge, it is one of the earliest to analyse the effect of the war between Israel and Palestine on the New York Stock Exchange using ESM. This research is intended as a noteworthy preliminary investigation into the impact of the discussed war on stock indices.

Despite every effort to select events carefully, wars are ongoing processes, which makes it more challenging to identify relevant ones beyond the start and end dates of the conflict; therefore, this can be considered a limitation, as noted by Gordon and Recio (2019). Moreover, the conflict discussed in this paper is still ongoing at the time of writing, which excludes the possibility of including the end date in the analysis.

The rest of the paper includes a Literature Review in section 1, which discusses the effect of conflicts and wars on commodity markets like oil by reviewing the existing financial literature. The methodology description in the second section explains the choice of data, the event study methodology, and the average return model. Moreover, it provides a table of the most significant events that are crucial for determining the war's impact. The results are presented in the third section. Finally, the fourth section concludes the paper and provides policy implications as well as suggestions for future research.

Literature Review

Military hostilities have far-reaching consequences that extend beyond physical combat. They also cause substantial negative impacts on human resources and physical assets, as well as severe financial consequences. This literature review aims to analyse the actual impact of wars, conflicts, and attacks on stock market returns by reviewing previous studies that used a similar approach.

Event study: theoretical foundations

In the late 1960s, the event study methodology was introduced by Fama, Fisher, Jensen, and Roll (1969), as well as Ball and Brown (1968). The paper by Fama *et al.* (1969) is

a classic event study, in which the authors found that, one year after a stock split, returns that had experienced a dividend 'increase' returned to their normal state. In the case of a dividend 'decrease', the residuals rose a few months before the stock split and then dropped a few months afterward. Furthermore, it was suggested that before the end of the split month – or more likely, immediately following the announcement date – the share price fully reflects the impact of the market's assessment of the information from the split. The study's findings therefore provided strong evidence of an 'efficient' stock market, which implies a quick reaction of stock prices to new information. Fama (1970) elaborated further in his work discussing the theory of the Efficient Market Hypothesis (EMH), distinguishing three subsections: the weak form, which is based on historical prices; the semi-strong form, assuming that prices and returns adapt to publicly available information (such as the stock split mentioned above); and the strong form, where a group of investors has access to information that the rest of the market does not.

Ball and Brown's (1968) research, which coincided with that of Fama *et al.* (1969), found that the degree to which a stock's actual return deviates from expectations shows how much new information has affected its value. The absolute value by which a stock's return deviates from its expected monthly return indicates the informational content related to that stock.

It has become common practice to use the event study methodology to measure how much a security's price reacts to announcements or events (Binder, 1998). Binder (1998) reviews the measurement and statistical analysis of abnormal returns using the market model, as well as the use of dummy variables in a regression framework. In his work, he concludes that cross-sectional dependence is a minor issue if the securities are chosen randomly and market model abnormal returns are used. However, in this paper, the stock selection is not random, and the model of abnormal returns used is different – specifically, the average return (mean-adjusted) model.

Additionally, Binder (1998) found that when the event date is unknown, it is more difficult for the event study methodology to detect abnormal returns. In contrast, in the analyses in this paper, the event dates were carefully chosen and will be presented in the methodology section. The author emphasises the importance of identifying the event date, along with MacKinlay (1997), who outlines in his paper the 'general flow' of event study analyses, as there is no strict procedure in this regard.

Behaviour of market returns in times of global uncertainty

To investigate the response of the capital market – particularly the commodity market, such as oil – to wars, military conflicts, disasters, and terrorist attacks, several papers were analysed.

In comparison to the past, capital markets can now recover from adverse events more quickly. For instance, Chen and Siems (2004) found that 27 out of 33 global stock markets in their sample, in the context of the 11 September 2001 terrorist attacks, recovered to their pre-event levels within 60 days. The authors believe this was due to the 4-day pause in trading, which allowed investors more time to absorb the information.

Another event discussed by Chen and Siems (2004) is Iraq's military attack on Kuwait, which resulted in negative cumulative abnormal returns (CAR) for 11 days and negative abnormal returns (AR) for 17 out of 18 markets sampled. For 40 days, global capital market stock prices remained below the pre-event level. The US market recovered more quickly than Europe's. This could be due to Europe's closer proximity to the conflict area and greater dependence on oil imports, or possibly the prompt action of US policymakers.

Guidolin and Ferrara (2010) conclude that the US market's reaction to disputes is more often positive than negative, compared to other country-specific stock market indices. The event study methodology they used involved the market model to estimate abnormal returns and aggregate these returns to calculate cumulative impacts. Their study investigated 101 conflicts over the period 1974–2004 and found that inter-state conflicts had a more significant impact on global markets than intra-state conflicts, due to their multi-country macroeconomic implications and more clearly defined conflict resolution paths. Moreover, they found that Middle Eastern events affected commodity prices, especially oil futures. Interestingly, prices increased before the conflicts actually took place and tended to decline once the conflicts started.

Ghanem and Rosvall (2014) discuss the impact of two major world events (MWE) on stock market prices: the airplane attack on the North Tower of the New York World Trade Center (11 September 2001), which led to 94% of the stock market's notable negative abnormal returns, and the 2007–2008 financial crisis, which led to a 50% fall in the S&P 500 Index. The study tests the hypothesis using t-tests based on daily abnormal returns, applying a mean-adjusted returns approach. The event window is 5 days (3 days before and 1 day after the event), and the estimation window is 10 days before the event. The study found that 'MWE in the globally integrated world economy in some extent does have a significant impact on stock market prices' and might lead to a spillover effect.

A study by Ji and Guo (2014) examines the impact of the 2011 Libyan war on the commodity market and the role of the Internet as a source of information influencing market participants and the consequent oil prices. The authors found that there was a 90% cut in oil production and a 20% increase in Brent prices. Moreover, it was evident to them that there was no concern either before or after the war, but only for a limited period during the conflict.

Gordon and Recio (2019) observe the short-term impact of specific events during the 2014 Russian-Ukrainian war that were reported in newspapers such as *The Wall Street Journal* and *Financial Times*, and how they affected oil prices. Surprisingly, the major events chosen for this particular paper had only a minimal effect. Nevertheless, the early stages of the conflict greatly impacted the European market, likely due to Europe's proximity to the conflict zone. Meanwhile, price-influencing events in the US market occurred before the 'Minsk Protocol', the truce signed on 5 September, possibly reflecting the indirect effects of the war through the US-EU-Russia relationship and sanctions imposed as a result of the conflict.

Amelya (2022) conducted an event study for 7 countries and 29 companies to analyse how Russia's invasion of Ukraine in 2022 affected oil and gas stocks. The abnormal returns before and after the invasion did not significantly differ. The reason for the insignificant abnormal average return (AAR) could be the leaked information regarding Russia's occupation of the Ukrainian border prior to the official invasion. Investors, presumably, anticipated the event and used that knowledge to generate abnormal returns.

An event study was one of several methods used by Wang *et al.* (2023) to examine how the wars in Iraq, Libya, and between Russia and Ukraine affected financial assets. According to the authors, the Shanghai Composite Index performed more steadily compared to the other selected financial assets – the S&P 500 Index, WTI oil price, and LBMA gold price. The CAR during the onset of the wars for the Shanghai Composite Index was insignificant, indicating centralised control that dampens external effects. Investors in China were not overly alarmed by the wars due to the government's neutral position and the country's geographical distance. The CAR was significant for the other investment instruments, leading the authors to conclude that such assets become unstable during war periods.

Obi, Waweru, and Nyangu (2023) examine how two sample groups – African economies and G7 countries – were impacted by the Russian-Ukrainian war that began in 2022. The event study methodology and an Exponential Generalised Autoregressive Conditional Heteroskedasticity (EGARCH) model were applied. The pre-event abnormal returns suggest that the invasion was highly anticipated, as Russian troops had begun gathering near Ukraine's eastern border. The results show greater AR and more significant pre-event losses for the G7 countries, raising concerns about their capacity to respond promptly to breaking news. Unexpectedly, African markets showed no significant post-event AR, implying that market efficiency was better reflected in the behaviour of African stock markets. Regarding the commodity market, CAR in both the pre- and post-event periods was positive. Food and energy costs increased due to the spike in commodity prices, particularly affecting sub-Saharan Africa, which relies heavily on imports.

Altemur, Eren, and Karaca (2024) assess the effect of the Israel–HAMAS conflict on the stock market indices of several nations in the region close to the conflict area, over a 15-day period (7 days before and after 7 October). They show that it had a statistically significant impact at the 10% level, with negative CAR. Additionally, the authors argue that the semi-strong form does not ensure the effective functioning of the market.

The Economist (2024) compared the price change during the Israel–HAMAS war and the Yom Kippur War, or the Fourth Arab-Israel War. The latter led to a fourfold increase in oil prices in 1973, whereas the current conflict did not cause oil prices to increase as dramatically; for most of 2023, they remained within the $75–85 per barrel range. One of the reasons is that 50 years ago, the Middle East accounted for 37% of global oil production, whereas in 2024, it is 29%. It is no longer the centre of the world's oil production. On the other hand, production in non-OPEC countries is increasing, while OPEC+ has introduced voluntary cuts to help maintain market stability.

To conclude, it is evident that wars and conflicts influence commodity prices. The effect can occur before the event if information is leaked, or immediately after the conflict begins. However, the impact is mostly short-lived; prices tend to return to their initial levels quickly. Moreover, geographical location plays a major role – the closer countries are to the conflict area, the more impact they experience, while those further away are less affected.

Methodology

Data description

This study employs a quantitative approach based on secondary data. Its main assumption is the EMH, the principal concept of which is that, given market efficiency, stock prices will reflect all relevant and accessible information. The historical performance of stocks is analysed using the average return model. Despite being simpler than the market model, the results tend to be fairly similar.

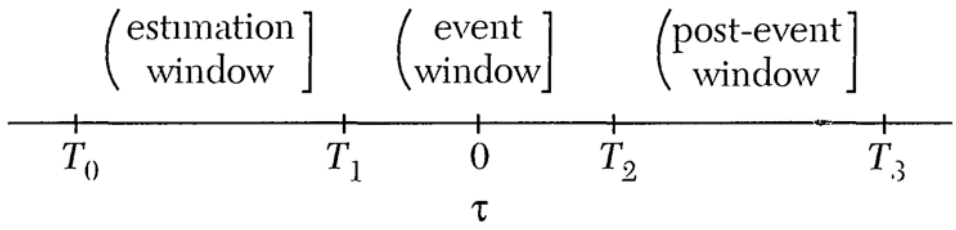
The dataset consists of daily stock returns for 10 oil-related corporations over two full years: 2022 and 2023. The practice of using daily data has become increasingly common, as it provides a larger sample, improves the understanding of the effect of specific events, and increases the accuracy of the analysis.

Event study methodology

Event dates

The event study methodology used in this paper is an analytical tool designed to examine the behaviour of security prices in response to various news or events. The primary step is identifying the key event and the time frame around that event date. A visual representation of the timeline is provided below (Fig. 1).

Figure 1.
Event study timeline



Source: MacKinlay (1997).

MacKinlay (1997) emphasises that the estimation window – the period for calculating normal returns prior to the event – should not overlap with the event window, which is the period surrounding the event. The purpose of this separation is to ensure that abnormal returns caused by the event do not influence the estimation of normal returns. Therefore, the estimation window in this study spans 440 days, covering the period from = -440 to = -4.

Following typical practice for events such as wars, the date that marks the beginning of the conflict is taken as the event date. In the context of this analysis, that is 7 October 2023, the date of Hamas's attack on Israel. This is denoted as t=0. There is no single best method for selecting the measurement period length; however, to assess how quickly and effectively the market absorbed the news, a longer event window is analysed. It spans the period before and after the event date, long enough to obtain statistically significant results, but not too long so as to avoid including irrelevant data (Laubscher, 2001). This also helps determine whether the event has a short- or long-term effect.

Considering the date of the attack as the event date, the main event window is 5 days: 2 days before the event and 2 days after, covering the range from = -2 to = +2. For the purpose of a robustness check, a shorter 3-day event window as well as a longer 7-day event window is applied.

The time interval between T_2 = +3 and T_3 = +59 is the post-event period. Furthermore, the most important and relevant dates, since the beginning of the war, are collected and presented in the table below.

Table 1.
Israel-HAMAS war event dates

Event date	Event Description	Source
07.10.2023	HAMAS attacked Israel.	Samuel, 2023
17.10.2023	Israeli airstrikes on southern Gaza. An explosion at a hospital in Gaza City causes heavy casualties and triggers outrage in the Arab world.	*Reuters*, 2023
18.10.2023	US President Joe Biden visits the Middle East to show support for Israel.	*Reuters*, 2023
27.10.2023	Invasion of the Gaza Strip.	*Reuters*, 2023
28.10.2023	Prime Minister Netanyahu announces a 'new phase' in the war on Hamas: increased air attacks and larger, sustained ground operations	Hutchinson, 2023
21.11.2023	Agreement on a four-day pause in fighting was announced by Israel and Hamas	*Reuters*, 2023
25.12.2023	Egypt has proposed a three-phase plan to end the war between Israel and Hamas.	Joseph, 2023
06.12.2023	Attack by Israeli forces on northern and southern Gaza in the 'most intense day of fighting since the war with Hamas began'.	Borger and Beaumont, 2023
13.12.2023	India voted at the UN in favour of a resolution for an immediate humanitarian ceasefire in Gaza	*The Economic Times*, 2023

Source: Author's research.

Once the event has been identified, selection criteria need to be ascertained. The requirements were for the chosen companies to be in the oil-related industry and publicly traded on the New York Stock Exchange. The sample will be described in detail in the next section.

Sample

Given that the dataset is composed of panel data structures, a panel model was chosen. As the focus is on the New York Stock Exchange, the dataset consists of the daily closing

prices of its ten companies for a period of 2 years, from 4 January 2022 to 29 December 2023. The stock prices are available from Monday to Friday; therefore, the returns are calculated for 500 trading days.

The New York Stock Exchange (NYSE) is a publicly traded company and the largest stock exchange in the world, holding 70% of the world's largest corporations and over 80% of the S&P 500 – an index that tracks the performance of the 500 largest US companies (Corporate Finance Institute, n.d.; Trenina, 2023).

There are over one hundred oil-related trading companies listed on the NYSE; however, for the purposes of this paper, the largest publicly traded oil and gas companies in the world were chosen: Chevron Corporation, ConocoPhillips Company, BP p.l.c., Equinor ASA, ExxonMobil Corporation, Marathon Petroleum Corporation, Occidental Petroleum Corporation, Phillips 66 Company, TotalEnergies SE, and Valero Energy Corporation (Yahoo Finance, n.d.).

Chevron Corporation was founded in 1879 and has developed into one of the largest producers of renewable fuels. The company's activities include natural gas and crude oil production, transportation, refining, marketing, and distribution (*Bloomberg*, 2024). Over the course of 10 years, the corporation's revenue fluctuated dramatically, frequently reflecting changes in the global oil market (Statista Research Department, 2024b). The revenue for the year 2023 was 196.91 billion US dollars, representing a 16.46% decline from 235.72 billion US dollars in 2022 (Statista Research Department, 2024b). Moreover, Chevron ranked second based on market capitalisation, with 212.87 billion US dollars (Statista Research Department, 2023b).

ConocoPhillips Company was founded in 2002 as a result of the merger between Conoco and Phillips Petroleum. It was fully engaged in every stage of the oil and gas value chain until 2012, when the 'downstream' sector – refining and marketing – became the responsibility of Phillips 66, and the 'upstream' sector – exploration and production of natural gas and crude oil – remained the main activity of ConocoPhillips (Ashburn, 2024). The company produced a total of 711 million barrels of crude oil per day in 2022 and reached 78.5 billion US dollars in revenue (Statista Research Department, 2023a). With a market capitalisation of 104.53 billion US dollars in 2023, it ranked third in the industry (Statista Research Department, 2023b).

BP p.l.c. is a British company whose securities are listed on both the London Stock Exchange and the New York Stock Exchange, where they are traded as ADSs (American Depository Shares). Each ADS corresponds to six ordinary shares (BP p.l.c., n.d.). In 2023, the company's total revenue was 210.13 billion US dollars, representing a 12.95% decrease compared to the previous year (*CNN*, n.d.).

Equinor ASA, a Norwegian company founded in 1972, was known as STATOIL until 2018 (Equinor ASA, n.d.). Listed on both the New York Stock Exchange and the Oslo Stock Exchange, the corporation handles both upstream and downstream

activities. Its revenue for 2023 was 1,129.433 billion US dollars, compared to 1,433.517 billion US dollars in 2022 (*The Wall Street Journal*, n.d.-a).

Exxon and Mobil came together to establish Exxon Mobil Corporation in 1999. Currently, the company is one of the largest crude oil and natural gas explorers and producers worldwide. Based on a market capitalisation of 309.75 billion US dollars, it ranks first in the United States (Statista Research Department, 2023b). According to Yahoo Finance, the revenue amounted to 344.6 billion US dollars, a decrease of 14% from 2022 (Simply Wall St, 2024).

Marathon Petroleum is a downstream company in the energy sector, founded in 1887. Its market capitalisation as of 2023 was 42.69 billion US dollars, placing it in 8th position in the ranking, right after Phillips 66 (Statista Research Department, 2023-b). In 2023, the company's sales reached 148.458 billion US dollars, whereas in 2022, they were 177.411 billion US dollars (*The Wall Street Journal*, n.d.-b).

Founded in 1920, Occidental Petroleum ranked 10th among the top ten oil and gas companies based on its market capitalisation of 39.43 billion US dollars (Statista Research Department, 2023-b). It explores hydrocarbons in the Middle East as well as the United States (OXY, n.d.). In 2023, the revenue was 28.331 billion US dollars, showing an almost 22% decline compared to the previous year (*The Wall Street Journal*, n.d.-c).

As mentioned earlier, Phillips 66 is a company involved in the refining, conveyance, storage, and marketing of petroleum products and natural gas. Its revenue for the year 2023 amounted to 147.262 billion US dollars, compared to 170.118 billion US dollars in the previous year (*The Wall Street Journal*, n.d.-d).

French company TotalEnergies SE has been engaged in the extraction and promotion of petroleum and energy for 100 years, since 1924. According to *The Wall Street Journal*, its revenue in 2023 totalled 202.518 billion US dollars (n.d.-e).

Lastly, founded in 1980, Valero Energy Corporation today has the capacity to process 3.2 million barrels of crude oil per day (Valero, n.d.). Statista reports 144.8 billion US dollars in revenue for the year 2023, which is once again a decrease compared to 2022 (2024c).

All the data – the closing prices for the oil stock companies – were taken from the Polish website Stooq.

Average Returns Model

The average return model is the selected approach for calculating the abnormal returns which are the difference between the actual returns and the average returns, described as follows:

$$AR_{it} = R_{it} - \overline{R}_i \tag{1}$$

Where is the abnormal return of stock *i* in period *t*, is the actual return of stock *i* in period *t*, and is the average return of stock *i*. In many papers, is replaced in the equation with, which is the expected or normal return. However, since the main focus of this paper is the abnormal return, it was decided to proceed with the average return.

In this model, the average return is equal to the mean return:

$$\overline{R_i} = \mu_i \tag{2}$$

Therefore, the abnormal return is calculated as follows:

$$AR_{it} = R_{it} - \mu_i \tag{3}$$

Afterwards, the following formula was used to calculate the actual returns:

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it}} \tag{4}$$

Where is the actual return, is the closing price of a stock in period *t* and is the closing price in the previous period.

The advantage of this model lies in its suitability for the paper, which as previously mentioned, focuses on the historical performance of stocks.

The cumulative abnormal returns (CAR) represent the sum of abnormal returns, used to calculate the impact of the war on stock values. Pre-event and post-event information is included to account for information leaks that occasionally occur prior to announcements or due to the expectation that an event may take place. The CAR formula for the event windows is as follows:

$$CAR_{i,t1,t2} = \sum_{t=t_1}^{t_2} AR_{i,t} \tag{5}$$

Prior to conducting the event study, a unit root test is performed to assess the stationarity of the stock returns. The following test types are used: Common root – Levin, Lin, Chu; Common root – Breitung; Individual root – Im, Pesaran, Shin; Individual root – Fisher–ADF; and Individual root – Fisher–PP. A normality test is applied to determine whether the data follow a normal distribution. Moreover, to examine the behaviour of returns over time, graphs for all companies are plotted.

Validity and reliability

To ensure the validity and reliability of the results, a regression is conducted using only one date – the beginning of the war. Later, more dates are included for comparison and, in some cases, excluded to avoid the influence of less significant events undermining the effect of the most critical ones.

7 October fell on a Saturday, meaning no stock prices were available for that date due to the absence of trading activity at weekends. Therefore, to enhance the reliability of the results, the event window is structured around the event date. Expanding the window helps to capture any delayed market responses or anticipated effects.

Limitations

The implementation of the EMH assumption has been challenged by a significant and growing body of research. According to Ball (2009), one of its key shortcomings is the concept of market efficiency itself. Under real-world conditions – especially during periods of market stress – these assumptions may not be accurate or applicable. Additionally, both experimental psychology and financial market evidence suggest that investors often overreact or underreact to new information. This contradicts Fama's efficient market theory, which relies on rational and efficient pricing. In short, a key limitation of EMH is its overly simplified view of the market.

Another constraint lies in the event selection process, particularly in identifying relevant dates during an ongoing conflict. As the dynamics evolve, it becomes increasingly difficult to isolate impactful events, since what is significant today may be overshadowed tomorrow.

An additional limitation is the challenge of isolating the effect of one event from others. Factors beyond the specific conflict under investigation – such as global economic conditions or political developments – may influence price movements. As a result, linking observed changes exclusively to the target event remains difficult.

Results

Diagnostic checks

The panel unit root test

The results of the first-generation panel unit root test in levels for the stock returns over two years are reported in Table 2. The six models are tested under three specification types: none, individual intercept, and individual intercept and trend. The null hypothesis for all the tests is the non-stationarity of returns (i.e., the presence of a unit root), and the alternative is stationarity, which indicates no unit root. The findings show that the variable is stationary in levels for all the tests, as the p-values are significant at the 1% level. Nevertheless, given the strong assumption of cross-sectional independence in the first-generation unit root tests, the outcomes require careful consideration, as they may be biased.

Table 2.
First-generation unit root test results in levels

Model	*LLC*	*Breitung*	*IPS*	*ADF*	*PP*
None	-32.29***	-	-	-28.29***	-41.63***
Individual intercept	-29.63***	-	-31.51***	-27.53***	-40.15***
Individual intercept and trend	-42.59***	-14.88***	-32.62***	-27.60***	-46.72***

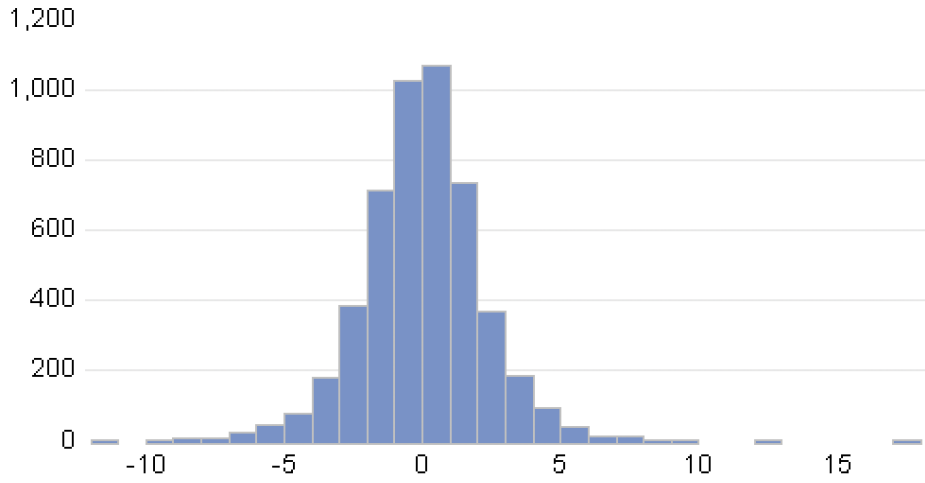
Note: *** – indicates significance at the 1% level. The Breitung test with 'none' and 'individual intercept' specifications and the IPS test with 'none' are not available in EViews software.

Source: Author's computations.

Normality test

As presented in Figure 2, stock values do not follow a normal distribution. Even though, at first glance, they may appear to form a bell-shaped curve, upon closer examination, outliers can be identified.

Figure 2.
Normal probability plot



Source: Author's computations.

Historical return plotting / Return performance over time

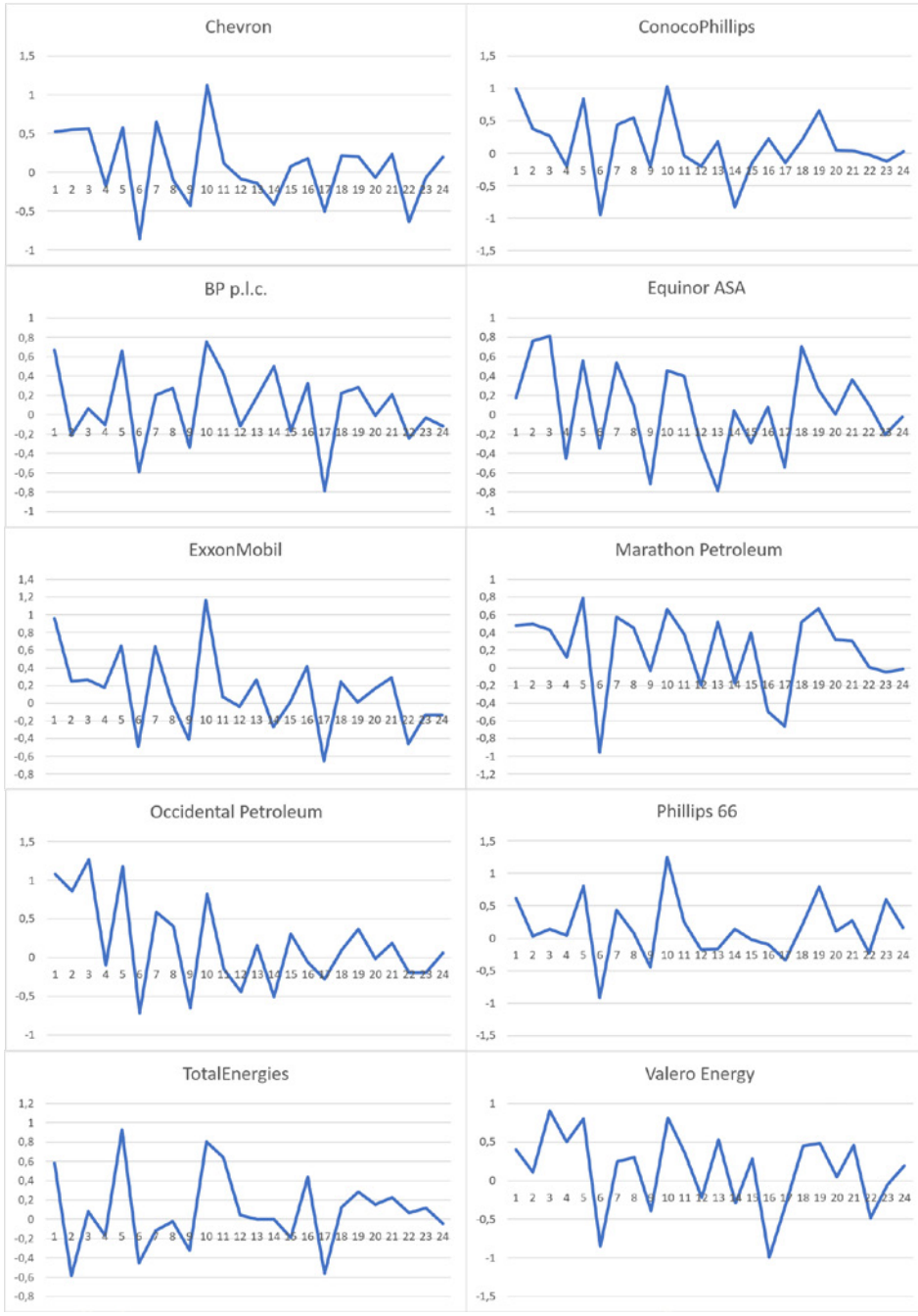
Additionally, monthly averages were calculated from daily data to enhance the visual clarity of Figure 3, which presents time series plots of returns for 10 companies over time. The data are not stable and fluctuate across different periods. Occidental Petroleum recorded the highest maximum across all the plots in March 2022, achieving 1.27%, whereas the lowest minimum of -0.58% belongs to TotalEnergies in February 2022. Moreover, when comparing September and October 2023, it is evident that returns from the month before the war were positive for all the companies, while the averages from October are reduced and mostly negative. In November, returns rose for some and declined further for others (see Table 3).

Table 3.
Maximum and minimum points of the plots and monthly returns for September, October, and November

Company	*Maximum*	*Minimum*	*September*	*October*	*November*
Chevron	1.12	-0.86	0.23	-0.64	-0.06
ConocoPhillips	1.03	-0.95	0.04	-0.02	-0.12
BP p.l.c.	0.75	-0.78	0.21	-0.24	-0.03
Equinor ASA	0.81	-0.79	0.36	0.10	-0.20
Exxon Mobil	1.60	-0.65	0.29	-0.46	-0.13
Marathon Petroleum	0.79	-0.95	0.3	0.01	-0.05
Occidental Petroleum	1.27	-0.71	0.18	-0.20	-0.20
Phillips 66	1.25	-0.91	0.27	-0.22	0.60
TotalEnergies	0.92	-0.58	0.23	0.06	0.11
Valero Energy	0.90	-1.00	0.46	-0.48	-0.05

Source: Author's computations.

Figure 3.
Time series graphs of plotted monthly returns over a 2-year time period



Source: Author's computations.

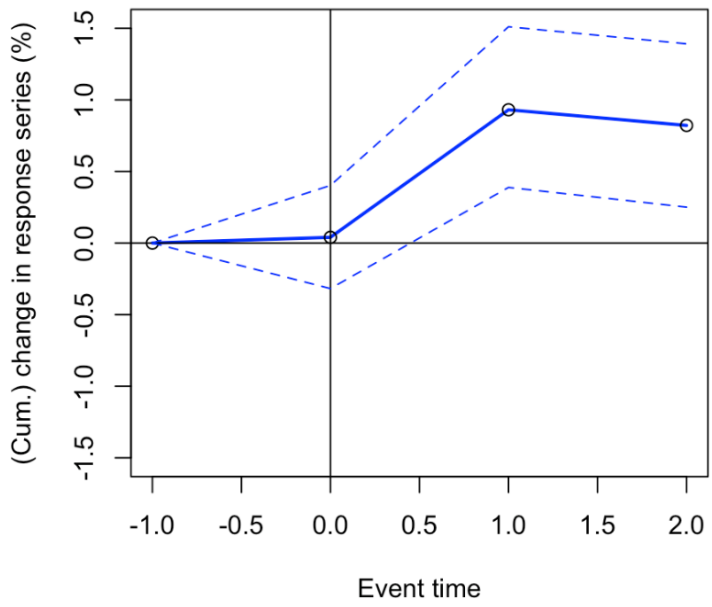
Analysis of stock returns performance

Further econometric analyses are conducted using the 'eventstudy' package in RStudio. To visualise the cumulative impact of the event over the designated timeframe, the sum of returns over the event window is accumulated using the software.

There is no strict procedure for conducting an event study, and as the reviewed literature reveals, researchers use various approaches, which suggests that it is rather intuitive. Consequently, the selection of the optimal event window is subjective. As the key event occurred on a Saturday, which is not a trading day, a five-day event window was chosen to observe the response, since the market reacted only on Monday.

Even though neither Israel nor Palestine are significant oil producers, the main cause of the increase in oil prices was investors' fear that the conflict might lead to oil sanctions or disruptions in the Middle East region's supply. Figure 4 presents the cumulative abnormal returns trend, showing that on the day after the event, there was a significant rise. Intriguingly, the upward trajectory is not maintained; a reversal is observed starting the following day, with a decline in CAR.

Figure 4.
Response visualisation of cumulative abnormal returns: 9 event dates considered, 5-day window



Source: Author-generated graph.

In defining the bounds of the CAR analysis for the pre- and post-event periods, the study employs three quantiles – 2.5%, 50%, and 97.5% – to represent the lower, mean, and upper ranges, respectively. The market's significant bullish reaction is reflected in period 1, extending from the lower boundary of 0.41 to the upper boundary of 1.46. In the second period, the boundaries decrease, indicating that the early positive effect is slowing down. Consequently, there is a small reduction in the mean compared to period 1 (see Table 4).

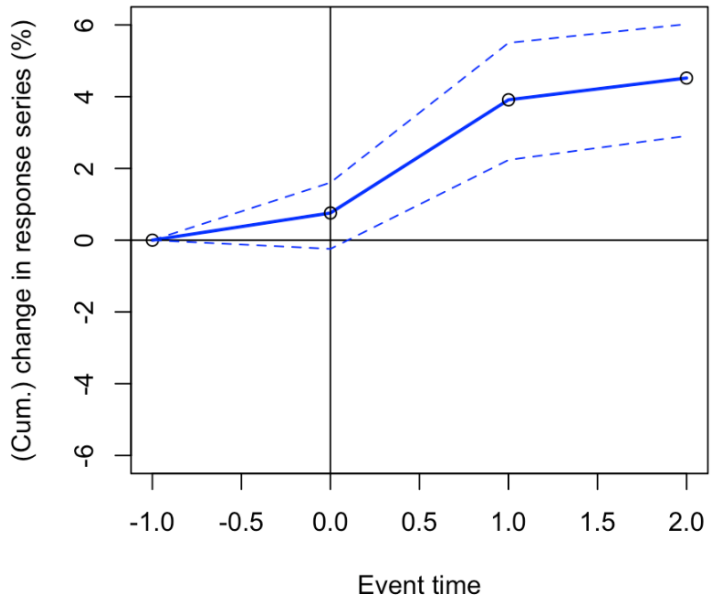
Table 4.
Lower bound, mean, and upper bound for three quantiles using 9 event dates, 5-day event window

	2.5%	50% (Mean)	97.5%
-2	0.0000000	0.00000000	0.0000000
-1	-0.3481793	0.04004685	0.3489815
1	0.4057764	0.93077860	1.4573546
2	0.2922092	0.82151225	1.3983867

Source: Author-generated computations.

Figure 5, which uses 7 October as the single event date, shows the same upward trend as Figure 1, although the boundaries and the mean are higher. On day 1 after the event, the lower boundary was at 2.18, the upper at 5.55, and the mean at 3.91 (see Table 5). The trend on day 2 after the event, in contrast to the downward trajectory seen in Figure 1, shows an upward, but less sharp, trend.

Figure 5.
Response visualisation of cumulative abnormal returns: 1 date considered (7 October), 5-day window



Source: Author-generated graph.

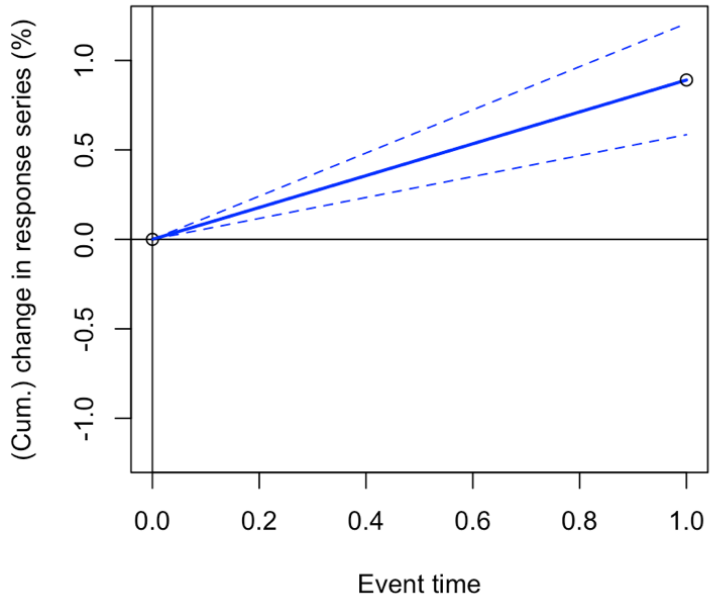
Table 5.
Lower bound, mean, and upper bound for three quantiles using 1 date (7 October), 5-day event window

	2.5%	50% (Mean)	97.5%
-2	0.0000000	0.0000000	0.000000
-1	-0.2187452	0.7575904	1.660530
1	2.1773253	3.9116201	5.547126
2	2.9993203	4.5184329	5.977897

Source: Author-generated computations.

For the purpose of conducting a robustness check, a three-day event window is also applied. The trend in Figure 6 for all the event dates exhibits an increasing pattern, pointing to a positive and rising trend in CAR across the time period, with a mean value of 0.89, a lower range of 0.62, and an upper range of 1.20, as presented in Table 6. It highlights a noteworthy reaction from the market following the occurrence of the event. Nevertheless, given that two out of three days in the window fall on the weekend, the reliability of the results is in doubt.

Figure 6.
Response visualisation of cumulative abnormal returns: 9 event dates considered, 3-day window



Source: Author-generated graph.

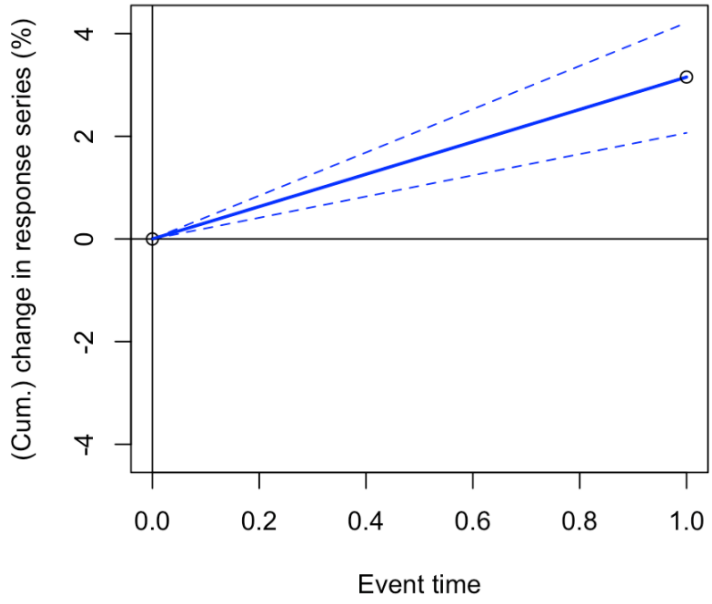
Table 6.
Lower bound, mean, and upper bound for three quantiles using 9 event dates, 3-day event window

	2.5%	50% (Mean)	97.5%
-1	0.000000	0.0000000	0.00000
1	0.616422	0.8907318	1.19975

Source: Author-generated computations.

The main difference for the 3-day event window using only one date is the bounds and the mean, which are higher in comparison to the 3-day event window for all dates. Moreover, the trend of the CAR is increasing and has positive confidence intervals.

Figure 7.
Response visualisation of cumulative abnormal returns: 1 date considered (7 October), 3-day window



Source: Author-generated graph.

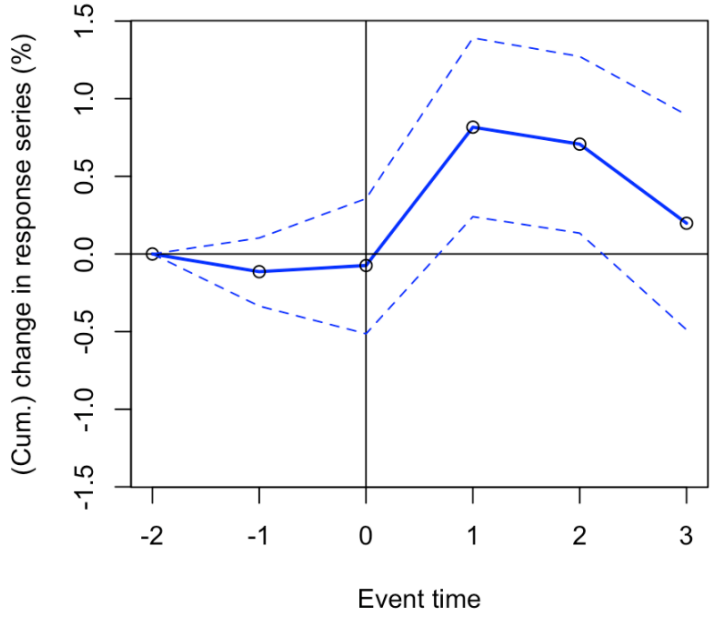
Table 7.
Lower bound, mean, and upper bound for three quantiles using 1 date (7 October), 3-day event window

	2.5%	50% (Mean)	97.5%
-1	0.00000	0.00000	0.000000
1	2.07926	3.15403	4.243936

Source: Author-generated computations.

Once more, to enhance the robustness of the analysis, a 7-day event window is analysed. Different patterns are observed in the trend across the periods. In Figure 8 during the first post-event date, the trend exhibits an ascending trajectory with confidence intervals of 0.24 (lower bound), 1.40 (upper bound), and 0.82 (mean), as presented in Table 8. However, the upward trend does not continue the following day, as the intervals decrease. By the third day, the trend shows a significant downturn. Nevertheless, the lower interval is negative and, therefore, does not allow the conclusions to be considered fully reliable, making it harder to determine whether the effect is positive or negative.

Figure 8.
Response visualisation of cumulative abnormal returns: 9 event dates considered, 7-day window



Source: Author-generated graph.

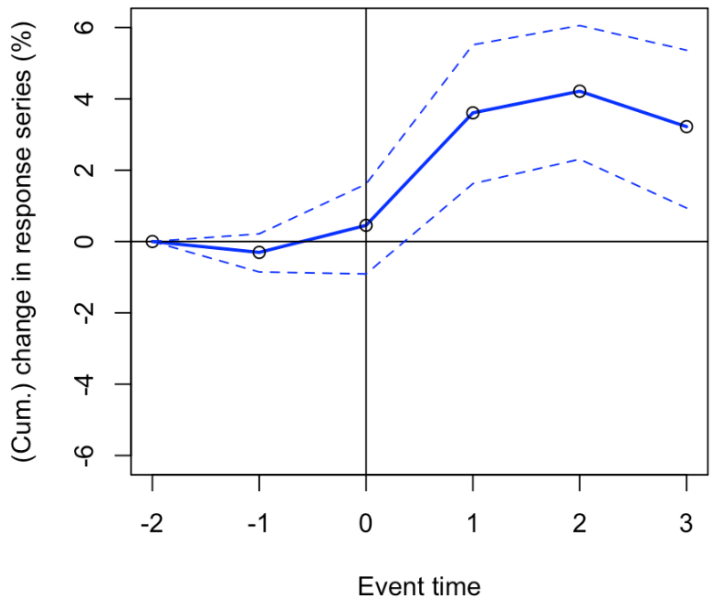
Table 8.
Lower bound, mean, and upper bound for three quantiles using 9 event dates, 7-day event window

	2.5%	50% (Mean)	97.5%
-3	0.0000000	0.0000000	0.0000000
-2	-0.3357430	-0.1141320	0.1029598
-1	-0.5137509	-0.0740852	0.3565961
1	0.2403638	0.8166466	1.3912363
2	0.1342067	0.7073802	1.2719192
3	-0.4880967	0.1979265	0.8954904

Source: Author-generated computations.

Figure 9 shows that the third post-event date within the 7-day event window has both positive lower and upper confidence intervals, whereas Figure 8 exhibits a negative lower interval for the same date of the window.

Figure 9.
Response visualisation of cumulative abnormal returns: 1 date considered (7 October), 7-day window



Source: Author-generated graph.

The mean rose from 3.61 on the first post-event date to 4.21 on the second. However, by the next day, it fell further to 3.22. Noteworthily, 9 October was the day when oil prices increased to $91 a barrel, up from slightly over $80 (Somasekhar, 2023).

Table 9.
Lower bound, mean, and upper bound for three quantiles using 1 date (7 October), 7-day event window

	2.5%	50% (Mean)	97.5%
-3	0.0000000	0.0000000	0.000000
-2	-0.8542468	-0.3043464	0.216016
-1	-0.9089419	0.4532440	1.611232
1	1.6220782	3.6072737	5.515948
2	2.3074578	4.2140865	6.056406
3	0.9391643	3.2210869	5.364803

Source: Author-generated computations.

The preceding two graphs show a distinct decrease in cumulative abnormal returns on the third day following the occurrence of the key event. The downward trend implies that the initial increase in CAR brought on by the start of the war was temporary.

Prices are falling even though severe fighting is taking place in a region that is vital to the world's petroleum supply. The decline in energy markets can be explained by pre-war events and bearish sentiment. Some OPEC+ countries, including Saudi Arabia, have attempted to sustain prices by introducing voluntary cuts. Additionally, prices were decreasing due to concerns that China faced signs of supply shortages as a result of production cuts. Moreover, Israel produces little oil, while Gaza produces none; therefore, traders would be more concerned if major oil-producing nations like Saudi Arabia or Iraq became more directly involved in the conflict.

Another reason the pricing trend is not continuing upward is the US market's propensity for faster recovery from adverse events in the Middle East, due to its geographic isolation and lower reliance on foreign oil.

Conclusions and recommendations

To conclude, the event study methodology applied to analyse the impact of the Israel–HAMAS war on the behaviour of oil-related companies' stock returns revealed interesting findings. The hypothesis suggested a significant impact; however, the effect was short-lived, even though the sudden jump in prices was quite substantial and increased uncertainty.

Numerous studies have already examined the impact of wars on the US market; however, this paper specifically investigates the impact of the war between Israel and Palestine on companies listed on the New York Stock Exchange. The stock returns are analysed for a period of two full calendar years using daily data. While the paper by Altemur, Eren and Karaca (2023) analyses the effect of the Israel–HAMAS war, its focus is on the stock markets of Middle Eastern countries. Nevertheless, the authors conclude that the war's impact on stock market indices was statistically significant. The 15-day observation period was reported to have a negative CAR. However, given the length of the window, it may have incorporated the effects of additional events occurring during that timeframe. The findings of this paper, in contrast, focus on several narrower windows. Cumulative abnormal returns show a growing tendency during the 3-day event timeframe. The data exhibit an increasing trajectory when a 5-day event window with a single event date is examined. On the other hand, the tendency starts to deteriorate on the second day after the key event when all event dates are taken into account within the same 5-day timeframe. When considering a 7-day event window, the pattern shows a rise during the first two days and a decline on the third day.

The literature aligns with the finding that the market recovers swiftly once the initial impact fades. Further investigation and analysis may be conducted to better understand the particular dynamics and long-term effects of such occurrences on the stock market. The chosen average return model is a relatively simple one; therefore, future studies could analyse the effect using more sophisticated models such as the market model. Addressing these limitations will help future research achieve a deeper and more comprehensive understanding.

Investors can use the findings to develop risk-management strategies that take into account how quickly geopolitical events might affect the price of oil stocks. They can more effectively time their entry and exit positions by gaining a better understanding of the temporal dynamics of market reactions.

To protect against price fluctuations, reduce dependence on oil, and spread risk, investors should diversify their portfolios across various asset types, industries, and geographical areas.

Moreover, these conclusions may assist policymakers in strengthening cooperation with international partners in risk assessment, crisis management, and emergency preparedness for geopolitical developments that cause disruptions in the oil and energy markets.

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The Effect of the Israel–HAMAS War on Stock Returns: An Event Study Approach

Abstract

This paper aims to analyse the reaction of oil-related stock companies to the start of the Israel–HAMAS war. In particular, it examines the short-term effects of the most significant events related to the conflict. The dataset incorporates 10 companies listed on the New York Stock Exchange over the course of two years, covering a period from January 2022 to December 2023. Daily data were preferred over weekly or monthly for their accuracy and larger sample size. The main research instrument is the widely used event study methodology (ESM), which operates under the assumption of the Efficient Market Hypothesis (EMH).

The primary outcome is that cumulative abnormal return (CAR) shows a positive reaction to the news of the war the day after its occurrence. However, the effect was temporary, as prices returned to the initial level – and even lower – very quickly.

Keywords: abnormal returns, cumulative abnormal returns, event study, Israel–HAMAS war

Wpływ wojny pomiędzy Izraelem a organizacją HAMAS na zwroty z akcji: podejście oparte na analizie wydarzeń

Streszczenie

Celem artykułu jest analiza reakcji spółek akcyjnych z sektora naftowego na wybuch wojny między Izraelem a Hamasem. W szczególności zbadano krótkoterminowe skutki najistotniejszych wydarzeń związanych z konfliktem. Zbiór danych obejmuje 10 spółek notowanych na Nowojorskiej Giełdzie Papierów Wartościowych w ciągu dwóch lat,

od stycznia 2022 r. do grudnia 2023 r. Wybrano dane dzienne zamiast tygodniowych lub miesięcznych ze względu na ich większą dokładność i liczebność próby. Głównym narzędziem badawczym jest szeroko stosowana metodologia badania zdarzeń (ESM), która opiera się na założeniu hipotezy rynku efektywnego (EMH).

Zgodnie z podstawowym wynikiem badania w ramach skumulowanej dodatkowej stopy zwrotu (CAR) odnotowano pozytywną reakcję na wiadomość o wybuchu wojny dzień po tym zdarzeniu. Efekt ten był jednak tymczasowy, ponieważ ceny bardzo szybko powróciły do poziomu początkowego, a nawet niższego.

Słowa kluczowe: dodatkowa stopa zwrotu, skumulowana dodatkowa stopa zwrotu, badanie zdarzenia, wojna między Izraelem a Hamasem

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