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Impact of Russia-Ukraine Conflict on the stock prices of US oil companies

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ABSTRACT:

This paper explores the impact of the Russia-Ukraine conflict on the stock prices of US oil companies. The study aims to determine the degree of benefit to the US oil industry following the immediate outbreak of the crisis.

The study employs a market-adjusted return model to analyze the Average Abnormal Returns (AAR) and Cumulative Abnormal Returns (CAR) of a sample of American oil company stocks. These returns serve as a proxy for market sentiment. The analysis focuses on the event window surrounding the start of the conflict to assess its impact on the market behavior.

The background of the conflict is explored, along with its escalation following Russia's annexation of Crimea in 2014. The study also reports the economic sanctions imposed by the US, EU, and other countries on Russia, and Russia's countermeasures. Furthermore, the literature review covers key concepts such as geopolitical crises, market interconnectedness, spillover effects across financial markets and countries, inflationary pressures, and the energy trade landscape.

The data collected includes daily stock prices of US oil companies and the S&P500 index, which serves as a benchmark. The study utilizes regression analysis to calculate the statistical significance of AAR and CAR. The empirical findings indicate a statistically significant positive CAR in the window (-3, +3), suggesting positive market sentiment towards the oil sector. This result supports the hypothesis that positive sentiment towards the oil sector counteracts the market shock of the event itself.

In conclusion, the thesis provides insights into the effects of the Russia-Ukraine conflict on the US oil sector by analyzing market sentiment through AAR and CAR. The research also identifies and analyzes how expectations of supply disruptions, increased demand for non-Russian oil, and the strategic importance of energy security have influenced market sentiment towards the oil industry. The findings support the hypothesis that there is a significant positive CAR in the window surrounding the start of the Russia-Ukraine conflict.

Keywords: Russia-Ukraine conflict, US oil companies, Stock prices, Average Abnormal Returns, Cumulative Abnormal Returns, Market Sentiment, Geopolitical Crisis, Energy Trade.

1 Introduction

The global energy market has experienced significant transformations in recent years, driven by geopolitical tensions and global economic uncertainty (Izzeldin M. et al, 2023). The energy market is characterized by evolving trade patterns which have been shifting mainly due to the tensions following the Russia-Ukraine conflict, which led to fluctuations in oil supply and prices with subsequent spillover effects across industries and markets (Baogui et al, 2023).

The sanctions from western countries and countersanctions from Russia following the beginning of the crisis had a multitude of effects on global markets. Their effectiveness is debated to this, as their ability to achieve broader economic and political objectives remains in question (Baogui et al, 2023).

On one hand, some researchers consider the reduction of the heavy reliance on Russian resources to be positive in the long run for western countries (Mohammed K. Et al, 2023), while others emphasize the lose-lose outcome of sanctions and suggest that reshaping global trade networks may delay the achievement of Sustainable Development Goals (Chen Y. et al, 2023). In a particular way, the sanctions on energy resources and oil that aimed at isolating and weakening Russia, triggered a series of economic problems, aggravated by the integration of economies, with the risk of spillover intensifying (Makonnen T. et al, 2023).

Europe was one of the most directly affected regions by the crisis due to its heavy reliance on Russian energy (Ahmed S., 2023). The invasion led to a sharp rise in energy prices, which strained European economies, contributing to inflation and increasing costs for industries and households (Ahmed S., 2023). The supply chain disruptions, particularly in sectors like agriculture and metals (steel, iron, palladium and nickel), and global shipping routes disruptions, particularly in the Black Sea, further complicated the economic situation worldwide (Ahmed S., 2023).

In fact, in North America, the US still faced challenges, with the spike in global oil prices leading to higher gasoline prices, contributing to inflationary pressures that were already present due to pandemic (Chen Y. et al, 2023). The US as a major energy producers, experienced some benefits from higher energy prices, but the broader economic impact included higher costs of living and disruptions in global trade, which affected businesses and consumers (Chen Y. et al, 2023).

The focus on the oil industry in this paper is chosen because of the central role of the trade of energy resources as a key driver of economic and geopolitical activity (Chen Y. et al, 2023). Also, the choice of investigating the correlation between the Russia-Ukraine conflict and the valuation of US companies operating in the oil industry, resides in the increasingly central role that the country plays in setting global energy trends, both as a major consumer and a significant producer of oil and gas resources (Chen Y. et al, 2023).

The paper also aims to fill gaps in previous literature regarding the actual impact of the beginning of the conflict on the public sentiment on this industry in this area, using a sample of stocks of American companies operating in the oil sector. The paper employs a simple market adjusted return model to analyze the Average Abnormal Returns (AAR) and Cumulative Abnormal Returns (CAR) of the stock prices of the sample (used as a proxy for market sentiment), to analyze the impact that the start of the Russia-Ukraine conflict had on the oil sector in the US. The sample proposes a wide industry coverage as it includes companies from various segments within the oil industry, such as integrated oil companies, exploration and production companies, offshore drilling, and oil-field services and equipment.

1.1 Hypotheses

In the previous chapter, it is presented that the increasing central role of the US in the energy trade patterns, led it to experience some benefits from higher energy prices, however the broader economic was negatively affected by uncertainty and volatility of financial markets (Chen Y. et al, 2023).

The paper aims to analyze the degree of benefits that the industry in the US had during the outbreak of the crisis (Chen Y. et al, 2023). In fact, expectations of supply disruptions, increased demand for non-Russian oil, and the strategic importance of energy security might have driven a positive market sentiment towards the oil industry on the event date (Chen Y. et al, 2023). These factors might have combined to create a favorable outlook for oil companies in the US, seen as a viable substitute to Russian oil (Chen Y. et al, 2023).

The AAR and CAR analyzed for the sample of the American stock prices used as a proxy for market sentiment, are used to test the following hypotheses:

Hypothesis 1: There is a negative stock market reaction on the event date of the conflict. The sudden uncertainty is reflected in the sample's significant negative AAR.

Hypothesis 2: There is a positive stock market reaction on the days following the event date. The positive speculations about the profitability of oil companies following the rapid increase in oil prices contributes is reflected in the sample's significant positive AAR.

Hypothesis 3: There is a significant positive CAR in the window (-3, +3), as the positive sentiment about the oil sector counteracts the market shock of the event itself.

1.2 Structure

The rest of this paper is organized as: Chapter 2 provides a background of the situation leading up to the main event studied, Chapter 3 reviews prior literature, Chapter 4 presents the sample and the data used in the event study, Chapter 5 analyses the AAR and CAR of the sample stocks, Section 6 discusses the effects of the conflict on the oil sector in the US, Chapter 7 concludes the study.

2 Background

The Russia-Ukraine conflict has roots in a complex history of disputes, and it escalated significantly in 2014 when Russia annexed Crimea. The annexation of Crimea had significant implications for the global economy, affecting international relations, trade, energy markets, and financial systems (Oikonomikou L. E., 2018).

The US, the EU, and other countries imposed a series of sanctions that targeted key sectors of the Russian economy, including finance, defense, and energy (Pak O. et al, 2016). Restrictions were placed on Russian state banks, limiting their access to international financial markets, the Russian energy sector was granted restricted access to technology, goods, and services for oil production, and the export of certain goods with potential military applications to Russia was banned. In response, Russia imposed countersanctions, particularly banning food imports from countries that had sanctioned it (Pak O. et al, 2016).

The sanctions and the broader geopolitical tensions highlighted Europe's dependence on Russian energy and spurred actions to reduce this dependency (Oikonomikou L. E., 2018). The risks associated with Europe's heavy reliance on Russia led the EU countries to accelerate efforts to diversify their energy sources (Oikonomikou L. E., 2018).

Trade ties between Russia and countries that imposed sanctions were directly affected, leading to a decrease in trade volumes and ripple effects on global supply chains, particularly in industries dependent on Russian resources (Pak O. et al, 2016). The conflict has also contributed to a realignment of geopolitical relationships, with sanctioned countries seeking to strengthen ties with alternative economic powers and Russia being suspended from the G8 group of industrialized nations (Pak O. et al, 2016).

These financial sanctions, oil prices drop, and subsequent depreciation of the Ruble led to a recession in the Russian economy (Orenstein M. A. et al, 2016). Russia's GDP contraction took place in 2015, highlighting structural weaknesses in the Russian economy,

including its heavy dependence on commodity exports and the lack of diversification into other sectors (Orenstein M. A. et al, 2016). The Russian economy began to show signs of stabilization and a modest recovery in the following years, partly due to a rebound in oil prices, adjustments to the economic sanctions regime, and policy measures taken by the government (Orenstein M. A. et al, 2016).

Between 2014 and February 2022, the situation was characterized by ongoing tensions, sporadic conflicts, and political efforts to resolve the crisis (D'Anieri P. et al, 2019). This period saw fluctuating levels of violence in the Donetsk and Luhansk regions, where local Pro-Russian separatist leaders declared independence from Ukraine, and diplomatic negotiations, such as the Minsk agreements (in 2014 and 2015) brokered by the OSCE, that included provisions for a ceasefire, the withdrawal of illegal armed groups, and the release of hostages (D'Anieri P. et al, 2019). Violations were common and diplomatic efforts were often stalled (D'Anieri P. et al, 2019). This caused the Western sanctions to be periodically expanded leading to escalated tensions between Russia and NATO countries, with increased military activities on both sides (D'Anieri P. et al, 2019).

The period of recovery and adaptation in the years leading up to 2022, saw both Russia and Ukraine making efforts to stabilize their economies, with gradual signs of recovery becoming evident from 2016 (D'Anieri P. et al, 2019). The Russian economy began showing signs of recovery, largely due to stabilizing oil prices, a gradual adaptation to the sanctions regime, and government policies aimed at economic diversification (D'Anieri P. et al, 2019). Efforts to boost domestic production in response to Western sanctions led to an increase in self-sufficiency in certain sectors; however, the economy remained vulnerable to fluctuations in global energy prices (D'Anieri P. et al, 2019).

The COVID-19 pandemic added a layer of complexity to the situation, with both positive and negative repercussions (Åslund, 2020). The immediate economic fallout from the pandemic was largely negative, leading to decreased industrial production and disruptions in global supply chains (Åslund, 2020). Both countries faced economic contractions

in 2020 as they implemented various fiscal and monetary measures to support the economy (Gullstrand J., 2020).

Also, the pandemic contributed to a sharp decline in global oil demand, leading to a historic drop in oil prices in early 2020 (Åslund, 2020). Given that oil is crucial to Russia's economy, both in terms of revenue and exports, this had a significant negative impact on the country's financial health (Åslund, 2020). The government's response, including fiscal stimulus, monetary easing, and healthcare investments, aimed to mitigate these negative impacts, but the long-term economic recovery remained an area of focus (Gullstrand J., 2020).

In February 2022, the situation escalated further when Russia invaded Ukraine, aggravating existing geopolitical tensions, disrupting international trade, and contributing to global economic uncertainty (Makkonen T. et al, 2023).

3 Literature Review

This Chapter explores theories, events and concepts in finance that relate to the Russia-Ukraine conflict, and it aims to understand if the impacts are reflected in this crisis as compared to similar situations prior to the event, through the investigation from previous literature. Important topics such as geopolitical crisis, market interconnectedness and energy trade patterns are analyzed in depth in this section of the paper and are linked to the research aim of exploring the magnitude of the effect of the event on the stock prices of US companies operating in the oil industry.

3.1 Geopolitical Crisis

A geopolitical crisis refers to a situation where political or territorial disputes between countries escalate to a point that threatens the stability of a broader area (Makkonen T. et al, 2023). These crises often stem from conflicts over borders or resources and can lead to economic sanctions, military confrontations, and breakdowns in diplomatic relations, and they can significantly impact the global economic landscape (Makkonen T. et al, 2023). Prior literature highlights the risks associated to a geopolitical crisis being disruptions to international trade, sudden changes in energy prices, and shifts in currency values, which lead to increased costs for businesses, challenges in supply chains, and a decrease in consumer confidence (Makkonen T. et al, 2023).

The GPR (Global Peace Index) is a measure based on various indicators used to assess the that evaluate the level of peace in a country. These indicators include levels of violence and crime, the degree of militarization, ongoing conflicts, relations with neighboring countries, and other societal safety and security measures. It provides an overview of the current state of peace across the globe, highlighting both peaceful and conflict-prone areas. Figure 1 shows the level of the GPR from 1970 to 2022, highlighting the state of peace world-wide in crises such as the one explored in this study.

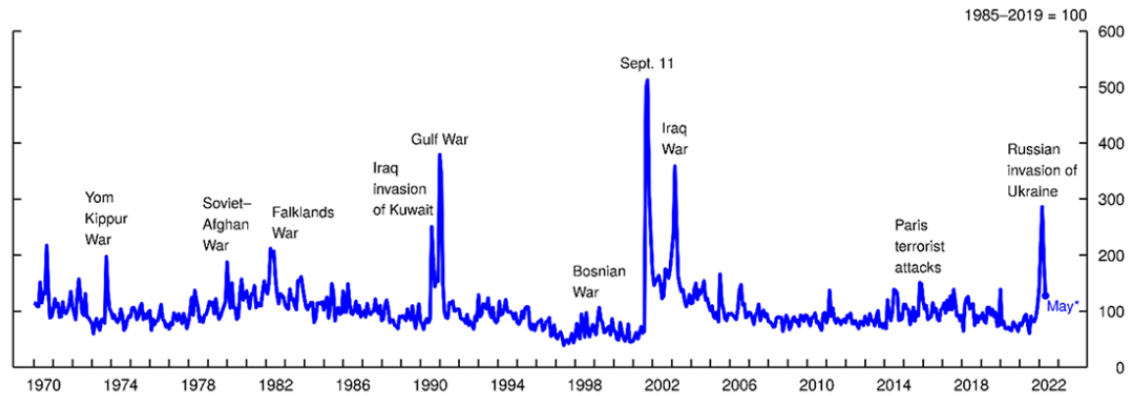


Figure 1: GPR index from 1970 to 2022 (The Fed, 2022).

3.1.1 The Russia-Ukraine Crisis

The conflict in 2022 happened at a particular time in history, as the world was still facing challenges posed by the COVID-19 pandemic, a global health crisis that was heavily affecting the global markets through different channels (Roy A. et al 2023). In fact, while a geopolitical crisis disrupts economies through conflict and uncertainty affecting trade patterns, a health crisis directly impacts labor markets and consumer demand (Roy A. et al 2023). Moreover, while a geopolitical crisis leads to sudden market volatility, a health crisis can cause prolonged economic downturns as governments and societies struggle to manage public health concerns while trying to sustain economic activity (Roy A. et al 2023).

As Roy A. et al (2023) examine, the Russia–Ukraine conflict further intensified the economic challenges from the pandemic, impacting commodity prices, especially in the energy sector. The conflict showed the vulnerability of the crude oil market to financial crises, emphasizing the bidirectional relationship between geopolitical factors, economic crises, and natural resource commodity prices (Roy A. et al 2023). Also, Roy A. et al (2023) compare the economic impact of the pandemic and the conflict on global markets, revealing that the energy sector is more impacted than the non-energy sector during both crises.

The concerns about energy security heightened and the fear of supply disruptions led to a surge in global energy prices, with oil prices spiking to their highest levels since 2014 (Gaio L. E., 2022). Natural gas prices also saw dramatic increases, exacerbating inflationary pressures worldwide and leading to higher costs for heating, electricity, and manufacturing (Gaio L. E., 2022).

3.1.2 The Sanctions and Countersanctions

In response to the invasion, the US, the EU, and other countries coordinated to impose unprecedented sanctions on Russia, targeting its financial system, including limiting access to international banking networks for Russian banks, and imposing asset freezes and travel bans on Russian officials and oligarchs (Baogui et al, 2023). These sanctions aimed to isolate Russia economically and financially, contributing to the immediate economic turmoil within Russia and affecting global markets (Chancharat S., 2023). Financial markets reacted with increased volatility, reflecting the uncertainty about the conflict's broader implications, and stock markets experienced significant downturns (Kumar S., 2023).

● Removed from SWIFT ● Access to SWIFT



Figure 2: The 30 Russian largest banks most of which sanctions and in red the ones banned from SWIFT (Atlantic Council, 2022).

There are many studies addressing the impact that the conflict and the sanctions had on the world's economies, such as the surge in energy costs and financial market downturns (Chancharat S., 2023). For example, Martins A.M. et al (2023) analyze how the insurance sector, despite being seen as a means of mitigating geopolitical risks, suffered unexpected losses. The times of uncertainty affected the banking sector as well, which yielded negative and statistically significant stock price reactions (Martins A.M et al, 2023). Boubaker S. (2023) identified a significant decline in the banking industry of nearly 1.5% in return on the event date and a persisted effect affecting particularly the US and EU. European financial stability, heavily reliant on Russian energy supply, has been significantly affected, leading to weaker profitability in the banking sector (Ahmed S., 2023).

In 2022, Van Bergeijk P. analyzed the effectiveness of historical sanctions imposed in a similar context to the Russian-Ukraine war and proposed robust sanctions that could impact the situation, including an embargo on capital goods and a boycott of Russian energy. Coincidentally, the embargo on capital goods was implemented along with finance sanctions, asset freezes, and visa bans, affecting global economies and energy trade patterns (Baogui et al, 2023). Russia's countersanctions affected global economies as well, with restrictions on the export of commodities and import substitutions, leading to shifts in the energy trade landscape and supply chains (Baogui et al, 2023).

3.1.3 The Effectiveness of the Sanctions

The energy sanctions resulted in economic damage to both the EU and Russia, with potential GDP losses reaching 1.5% for the EU countries and 4.8% for Russia (Chen Y. et al, 2023). Similar numbers are presented by Hosoe N. et al (2023) who estimate a decline in Russia's GDP by 3–7%, primarily due to a significant reduction in exports.

The effectiveness of the sanctions is debatable, as while sanctions have undeniably impacted the Russian economy and isolated it from international markets, their ability to achieve broader political objectives remains in question (Baogui et al, 2023). Russia's

countermeasures have provided some economic stabilization and retaliatory pressure but at the cost of accelerating global efforts to reduce dependence on Russian energy (Mohammed K. Et al, 2023). On one hand, some researchers urge policymakers to consider the changing macroeconomic environment and reduce reliance on Russian energy, emphasizing the transition to sustainable energy sources (Mohammed K. Et al, 2023), and others emphasize the lose-lose outcome of energy sanctions and suggest that reshaping energy trade networks may even delay the achievement of Sustainable Development Goals (Chen Y. et al, 2023).

Clearly, the sanctions on energy trade are aimed at isolating and weakening Russia, however, the escalation of the conflict has confirmed only triggered a series of economic problems, aggravated by the integration of economies, with the risk of spillover intensifying (Makkonen T. et al, 2023). Significant problems related to spillovers are volatility transmissions and inflationary pressures led by the increases in oil prices (Makkonen T. et al, 2023).

3.2 Market Interconnectedness and Spillovers

Market interconnectedness refers to the concept that financial markets are linked in various complex ways that can be observed through the movement of prices, capital flows, information, and risk across different countries, asset classes and sectors (Naeem M.A., 2023). The concept incorporates connections mediated through common exposures to global risks, regulatory frameworks, and psychological factors (Naeem M.A., 2023). As globalization intensified, these interconnections have become more pronounced, leading to a global financial system where shocks in one part of the world can quickly propagate, influencing economies and markets (Kumar S., 2023). Figure 3 proves this interconnectedness by showing how different markets reacted similarly to the crisis and following the same trends and patterns.

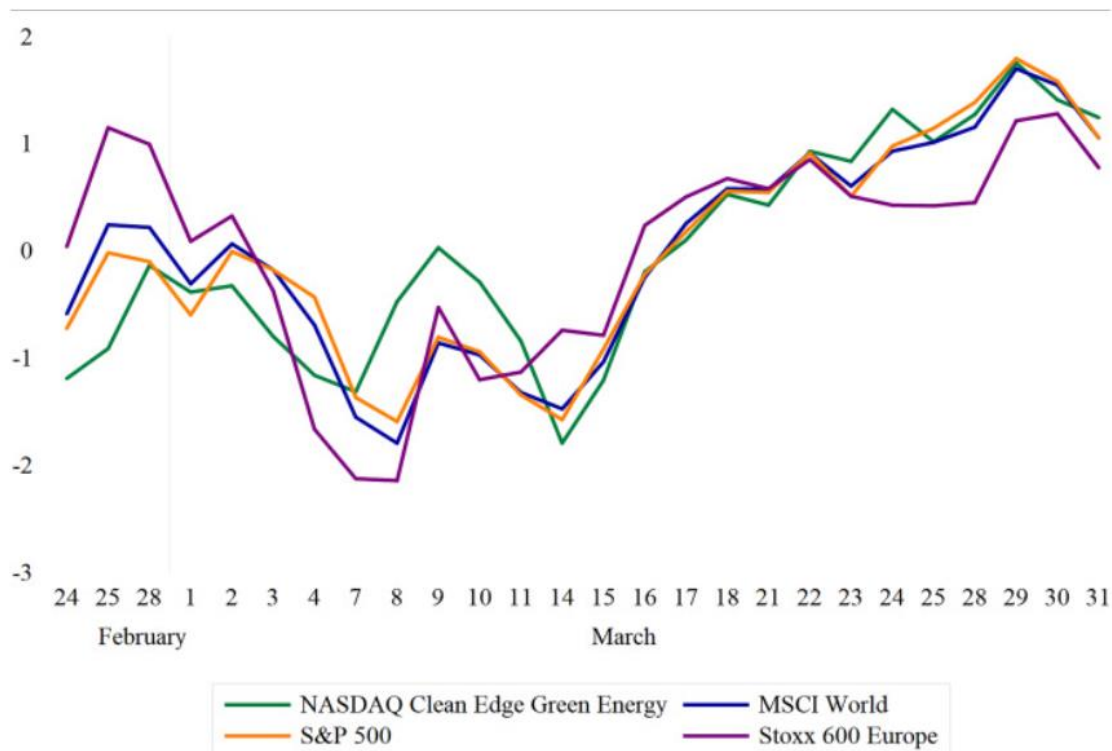


Figure 3: Major stock market indices response following the Russian-Ukrainian invasion (Izzeldin M. et al, 2023).

Economists have contributed to the discourse on market interconnectedness, especially in the aftermath of the 2008 global financial crisis, which underscored the degree to which economies and markets are interconnected (Reinhart C. and Rogoff K., 2011). Works by economists such as Reinhart C. and Rogoff K. (2011) provide insights into market interconnectedness and the consequential spillover effects, which are the effect of economic shocks in one country or market segment transmitted across borders.

3.2.1 Spillover Effects Across Financial Markets

Evidence shows how markets are particularly sensitive to geopolitical crises because they create uncertainty and risk, as investors and businesses fear their unpredictable outcomes, leading to volatility in stock markets, fluctuations in currency values, and changes in commodity prices (Kumar S., 2023). As a matter of fact, many recent studies have been examining the interconnectedness among commodities and capital markets

throughout this Russia-Ukraine conflict in 2022 (Kumar S., 2023). The nature of this relationship varies depending on the crisis, influencing global economies, and underlining the importance of understanding these interconnections for effective risk management and policy decisions (Kumar S., 2023). Previous literature has highlighted how Time-Varying Parameter (TVP) and Vector Autoregressive (VAR) approaches are particularly effective for estimating market interconnectedness and spillovers due to their ability to capture the dynamic nature of financial markets. (Naeem M.A., 2023).

More specifically, Si Mohammed K. Et al (2023) explore the same relationship between oil prices and stock markets (in G5+ countries) investigating the volatility spillovers from a period prior to the pandemic and the Russia-Ukraine crisis. Si Mohammed K. Et al (2023) reveal that the relationship between oil prices and the stock markets does not operate uniformly, but it varies depending on the direction of the change and the external factors (Si Mohammed K. Et al, 2023). Si Mohammed K. Et al (2023) also affirm that while the pandemic had far-reaching effects on global demand for oil, leading to price volatility and economic uncertainty, the direct and immediate consequences of the conflict on oil supply and prices are more substantial. This comparison underscores the sensitivity of oil prices to the geopolitical stability between Western countries and Russia and the cascading effects on financial markets (Si Mohammed K. Et al, 2023).

Utilizing a similar approach (TVP-VAR), Cui J. et al (2023) find a positive correlation between crude oil and other commodity futures, which is intensified by the two crises, indicating that the strength of this relationship fluctuates. The conflict seems to amplify the degree to which the prices of oil and other commodities move together (Cui J. et al, 2023). Such commodities include food and agricultural commodities (wheat, corn, barley, and sunflower oil) and metals (palladium, nickel, and aluminum), reflecting the interconnectedness of global markets and the specific roles Russia and Ukraine play in the supply of these commodities (Cui J. et al, 2023).

3.2.2 Spillover Effects Across Countries

Kumar S. (2023) utilizing this TVP-VAR technique in his research, unveils a high level of connectedness during the COVID-19 period, with EU countries being significant spillover suppliers to other commodities and global markets. Conversely, during the Russia-Ukraine conflict, the US emerged as the net receiver of volatility spillovers, while Russia and the EU are net transmitters, meaning that the US is more affected by economic disturbances from abroad than the other way around (Kumar S., 2023). The US emerged as a net receiver of volatility spillovers because of its role in the global financial system and the nature of the conflict's impact on energy markets and supply chains (Kumar S., 2023). As a matter of fact, the US benefitted from the rising prices in the energy sector, as a major consumer and a significant producer of oil and gas resources (Chen Y. et al, 2023).

The notable differences between the COVID-19 and Russia-Ukraine periods are confirmed by the study conducted by Naeem M.A. (2023) who confirmed the interconnectedness between equity and commodity markets, with health and geopolitical risks significantly impacting the return and volatility systems. The research explores risk transmission and market characteristics during crises, identifying an association with heightened uncertainty from the Russia-Ukraine conflict (Naeem M.A., 2023).

Given the detailed exploration of the interconnectedness among different markets during periods of crisis, the Russia-Ukraine conflict reflects the expected effects of the shocks playing a key role in shaping market dynamics, influencing the global financial markets and the flow of goods and commodities, and their prices (Cui J. et al, 2023). Additionally, Market interconnectedness is a determinant factor of global inflation during times of crisis, as the high interconnectedness of the global financial systems through trade, investments, and financial flows leads to economic shocks to be quickly transmitted across borders (Chen Y. et al, 2023).

3.3 Inflationary Pressures in Geopolitical Crises

During times of geopolitical crises, inflation often emerges as a major economic issue, as these events cause disruptions in supply chains, rising commodity prices, and changes in consumer behavior, all of which contribute to increasing prices (Wu T. et al, 2023). Previous literature highlights how geopolitical crises can disrupt the flow of goods and services, making them less accessible and more expensive (Aharon D.Y. et al, 2023). Additionally, such events lead to uncertainty and instability, potentially eroding confidence in a nation's currency and causing it to depreciate (Aharon D.Y. et al, 2023). This uncertainty in the financial markets often leads investors to shift towards safer assets, such as gold, which can further drive up costs (Chancharat S., 2023).

Central banks might respond to these uncertainties by adjusting monetary policies, such as increased interest rates to temper inflation, with the downside of slower economic growth (Wu T. et al, 2023). Also, financing expenditures to cope with geopolitical crises (military and defense spending) through borrowing or printing money can further exacerbate inflationary pressures (Aharon D.Y. et al, 2023).

The interaction between supply shocks, demand fluctuations, and policy responses in a geopolitical crisis creates a complex environment where inflation can become both a symptom and a contributing factor to the economic challenges faced by countries (Aharon D.Y. et al, 2023). Managing inflation in such contexts requires careful balance in monetary and fiscal policies, considering the multifaceted impacts of the crisis on the economy (Aharon D.Y. et al, 2023).

3.3.1 Responses to Rising Inflation in 2022

Evidence shows how in the Russia-Ukraine conflict, the spillover effects and the heightened volatility in financial markets served as a catalyst for inflation, affecting global economies (Chen Y. et al, 2023). The combined effect of higher energy prices, increased food prices, and disrupted supply chains have contributed to inflationary pressures worldwide,

complicating monetary policy decisions for central banks (Izzeldin M. et al, 2023). The inflation rising globally projected a slowdown in annual GDP growth, with vulnerabilities in the US and the EU (Izzeldin M. et al, 2023).

Prior literature shows that inflation rates tend to move together globally due to similar monetary policies, correlated business cycles, and the impact of global factors on inflation, with an overall total inflation connectedness peaking during crises (Aharon D.Y. et al, 2023). Aharon D.Y. et al (2023) highlight a high level of connectedness during the COVID-19 period, which further surged due to the 2022 Russia-Ukraine conflict. The conflict contributed to rising inflation, which was already heightened by post-pandemic recovery efforts (Wu T. et al, 2023).

Tighter monetary policies by central banks worldwide, including the Federal Reserve and the ECB have implications for global economic growth, with the potential to slow down economies but also aiming to stabilize prices (Izzeldin M. et al, 2023).

The US experienced its highest inflation rates in several decades starting in 2021 and continuing into 2022 (Lyocsa S. et al, 2023). This was initially driven by a strong recovery from the COVID-19 pandemic, leading to increased consumer demand, coupled with supply chain bottlenecks (Aharon D.Y. et al, 2023). The situation worsened with rising energy and food prices, and the Feds started a series of interest rate hikes in 2022, aiming to cool down the economy by making borrowing more expensive (Lyocsa S. et al, 2023). The EU countries also faced record inflation levels during this period, mainly because of their vulnerability to energy price spikes (Lyocsa S. et al, 2023). The European Central Bank, which had historically maintained low interest rates, began tightening its monetary policy in response to the inflation surge (Lyocsa S. et al, 2023).

Russia experienced a sharp increase in inflation following the imposition of international sanctions, leading to a devaluation of the Ruble, which spiked import costs and consumer prices (Lyocsa S. et al, 2023). The Central Bank of Russia initially raised interest

rates significantly to support the Ruble, which eventually stabilized due to capital controls and high energy prices (Lyocsa S. et al, 2023). For a quicker stabilization of the Ruble, Russia imposed a requirement for gas payments in Rubles, suspended FX trading, and promoted local payment systems (Lyocsa S. et al, 2023).

3.4 Energy Trade Landscape

This Chapter analyses the evolution of the energy trade for the countries that were affected the most by the Russia-Ukraine conflict. As previously highlighted, the crisis has clearly had heavy impacts on the Eurozone, heavily reliant on the Russian energy, as well as the US, as an established player in the provision of energy resources from overseas.

3.4.1 Energy Trade Before the Crisis

Before the Russia-Ukraine conflict escalated in early 2022, global energy trade patterns were relatively stable but complex, shaped by decades of geopolitical relationships, economic policies, and the evolving energy needs of a growing global economy (Baogui et al, 2023). Russia was a central player in the global energy market, especially in the EU, where it was the largest supplier of natural gas and oil (Baogui et al, 2023).

European countries heavily depended on Russia for around a third of their natural gas supplies, funneled through a network of pipelines that included Nord Stream 1, running directly from Russia to Germany under the Baltic Sea (Baogui et al, 2023).



Figure 4: Most relevant pipeline import routes into the EU and location of LNG terminals. (Brugel, 2024).

The United States had also become a significant player in the global energy market, as one of the world's largest consumers of energy and a major producer of oil and natural gas, thanks to the shale boom - period of rapid growth in the production of these resources from shale formations, driven by advances in drilling technologies (Chen Y. et al, 2023). This positioned the US as a net energy exporter to certain markets, altering traditional energy trade flows and reducing some regions' dependency on Middle Eastern countries, which remained key players in global oil supply (Chen Y. et al, 2023). Global energy trade was also characterized by the growing significance of LNG as a flexible and increasingly popular energy source (Chen Y. et al, 2023). LNG allowed for the transport of natural gas across the ocean from the US, diversifying gas supply sources for many

Figure 5: Most relevant pipeline import routes into the EU and location of LNG terminals. (Brugel, 2024).

While European nations sought new partners for energy imports, Russia looked to Asia, particularly China and India, as alternative markets for its exports, a realignment that has implications for global energy diplomacy and trade, potentially leading to new alliances and partnerships (Baogui et al, 2023). In response to the vulnerability exposed by reliance on Russian energy, European countries accelerated efforts to diversify their energy sources, including increasing imports of LNG from the US and Middle East (Chen Y. et al, 2023). Increasing imports of LNG and non-Russian pipeline gas (from Norway) partially compensated for the shortfall, but risks for EU gas provision remains as the level of gas storage in the EU stood below the 2015 to 2020 average (Chen Y. et al, 2023).

The crisis not only impacted European energy costs but also had ripple effects globally, as the crisis has prompted a reassessment of energy security policies worldwide, with governments becoming more focused on ensuring stable and secure energy supplies, which includes building up strategic reserves, enhancing infrastructure resilience, and developing policies to support energy diversification (Baogui et al, 2023).

The European countries, alongside exploring alternative pipeline routes, have been investing in renewable energy infrastructure, to increase the energy independence from other countries, prompting many governments to reevaluate and accelerate their energy transition strategies (Baogui et al, 2023). The energy crisis precipitated by the conflict has paradoxically served as a catalyst for renewable energy and decarbonization efforts. With fossil fuel prices soaring, renewable energy sources became more competitive, encouraging investment in wind, solar, biomass, and other renewable technologies (Baogui et al, 2023).

3.4.3 Shifts in Supply Chains for Oil

In 2021, Russia produced 540 million tons of crude oil (13% of global production) of which 260 million tons were exported (13% of global exports of the commodity) (Hosoe

N. et al, 2023). Also, Russia refined the remaining 290 million tons of which 140 million tons were exported as refined products (11% of global refined exports) and 150 million tons were consumed domestically (Hosoe N. et al, 2023). In 2021, the country was the largest supplier of energy commodities to the euro area, accounting for 23% and 43% of euro area crude oil and coal imports, which represented 9% and 2% of the euro area's primary energy consumption (Hosoe N. et al, 2023).

Following Russia's invasion of Ukraine, weekly oil shipments from Russia declined by 15% in one month as compared to the previous year's level, a decline that was especially pronounced for the US (-60%) and the EU (-35%) (Hosoe N. et al, 2023). In May 2022, the European Council held a meeting to stop most Russian oil imports with ban on all seaborne oil shipments from Russia by the end of the year, with a temporary exemption for crude oil delivered via pipeline (Hosoe N. et al, 2023). The EU sanctions also included a ban on exports of cutting-edge technology from the EU countries used to develop the Russian oil extraction (Hosoe N. et al, 2023).

While the EU scaled back oil imports and sourced more oil from the US and Africa, Russia redirected oil exports to other destinations, but signs of significant, persistent reductions in Russian oil production emerged, with the Russian oil supply falling by 25% in the second half of 2022 (Baogui et al, 2023). Russia moved its exports to China and India which increased to 11% and 14% respectively at end of June 2022, up from 6% and 2% before the crisis (Baogui et al, 2023).

The price of Russian oil fell at the start of the war and was selling at a steep discount compared to Brent (nearly 30% less in March 2022) (Adekoya O.B. et al, 2023). On March 2022, the Brent oil reached \$139.13/barrel, the highest price since July 2008 and the WTI crude oil touched \$133.46/barrel (Adekoya O.B. et al, 2023). Since then, crude oil prices have remained consistently high, experiencing short-term fluctuations during the Russia-Ukraine negotiations and the sanctions and countersanctions announcements (Adekoya O.B. et al, 2023). Previous research shows that the conflict resulted in a \$37.14

increase in WTI crude oil prices, reaching 52.33%, and a \$41.49 increase in Brent crude oil prices, reaching 56.33%. At the same time, the Russia–Ukraine war led to short-term drastic fluctuations in crude oil prices and fundamentally changed the long-term trend of crude oil prices (Adekoya O.B. et al, 2023).

Oil and U.S. Gas Prices, 2004-2022

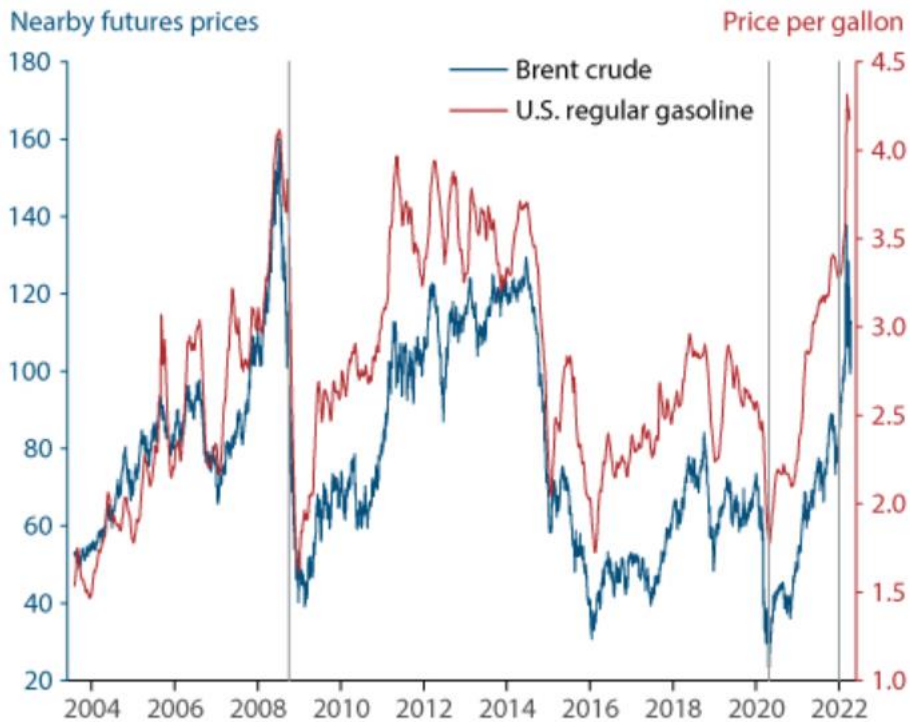


Figure 6: Oil and US Gas Prices from 2004 to 2022 highlighting the spike in 2022 (The Fed, 2022).

The higher in oil prices also influenced the stock markets that substituted Russia in the provision of this commodity, that sought a surge in the stock prices of companies related to the oil sector (Adekoya O.B. et al, 2023). The surge can be attributed to several interconnected factors influencing such as an increased revenue and profit margins for oil companies and their capability of increasing their supply in times of crisis (Adekoya O.B. et al, 2023).

4 Data Collection

This study investigates the effect of the Russia–Ukraine crisis on the performance of publicly traded firms operating in the oil sector in the US. The daily returns of the 23 largest publicly traded American companies operating in the oil sector are collected from the Refinitiv DataStream database. These firms are the largest in their sector in terms of market capitalization and they were all included in the S&P500 during the event window. Table 1 states the name of the company, the specific segment they operate in within the oil sector and their ticker.

	Company	Industry	Ticker
1	EXXON MOBIL	OILIN	XOM
2	CHEVRON	OILIN	CVX
3	CONOCOPHILLIPS	OILCP	COP
4	EOG RES.	OILCP	EOG
5	OCCIDENTAL PTL.	OILCP	OXY
6	PIONEER NTRL.RES.	OILCP	PXD
7	HESS	OFFDS	HES
8	DEVON ENERGY	OILCP	DVN
9	DIAMONDBACK ENERGY	OILCP	FANG.O
10	COTERRA ENERGY	OILCP	CTRA.K
11	MARATHON OIL	OILCP	MRO
12	Equitable	OILCP	EQT
13	APA	OILCP	APA.O
14	CHESAPEAKE ENERGY	OILCP	CHK
15	TEXAS PACIFIC LAND TRUST	OILCP	TPL
16	OVINTIV (NYS)	OILCP	OVV
17	SCHLUMBERGER	OILES	SLB
18	HALLIBURTON	OILES	HAL
19	KINDER MORGAN	OILES	KMI
20	WILLIAMS	OILES	WMB
21	BAKER HUGHES A	OILES	BKR.O
22	ONEOK	OILES	OKE
23	TARGA RESOURCES	OILES	TRGP.K

Table 1: List of American firm included in the sample.

The sample propose a wide industry coverage, as it includes companies from various segments within the oil sector, such as integrated oil companies (Exxon Mobil, Chevron), exploration and production companies (ConocoPhillips, EOG Resources, Occidental Petroleum), offshore drilling (Hess), and oilfield services and equipment (Schlumberger, Halliburton). Moreover, the list includes companies of varying sizes and market cap, from industry giants like Exxon Mobil to smaller E&P firms like Coterra Energy.

The wide industry coverage is also visible in Table 2, which show the descriptive statistics of the market adjusted returns for each one of the stocks in the sample. In fact, not all the stock returns are behaving in the same way, with Occidental Petroleum which appears to behave differently from the others in terms of high mean, standard deviation (indicating high volatility) and significant positive skewness (suggesting frequent small gains). On the other hand, Schlumberger and Halliburton also stand out with their negative mean returns, indicating underperformance relative to other stocks.

	EXXON	MOBIL	CHEVRON	CONOCOPH	EOG RES.	OCCIDENTAL	PIONEER	NTRI	HESS	DEVON EN	DIAMOND	COTERRA	IMARATHON	EQT	APA	CHESAPEAKE	E TEXAS	PACIFIC	OVINTIV	SCHLUMBER	HALLIBURTON	KINDER	MORGAN	WILLIAMS	BAKER	HUI	ONEOK	TARGA	RESOURCES	
Mean	0.0041	0.0189	0.0115	0.0075	0.0267	0.0089	0.0130	0.0130	0.0103	0.0123	0.0089	0.0101	0.0232	0.0273	0.0298	0.0224	0.0298	0.0224	-0.0098	-0.0011	0.0093	0.0117	-0.0029	0.0053	0.0094	0.0094	0.0094	0.0094	0.0094	
Standard Err	0.0067	0.0097	0.0094	0.0148	0.0227	0.0105	0.0053	0.0147	0.0092	0.0146	0.0085	0.0128	0.0119	0.0073	0.0202	0.0180	0.0202	0.0180	0.0089	0.0091	0.0071	0.0074	0.0074	0.0066	0.0054	0.0054	0.0054	0.0054	0.0054	
Median	0.0045	0.0186	0.0180	-0.0015	-0.0004	0.0191	0.0101	0.0104	0.0197	0.0088	0.0063	0.0038	0.0197	0.0313	0.0297	0.0210	0.0297	0.0210	-0.0063	-0.0144	0.0065	0.0064	-0.0037	-0.0026	0.0040	0.0040	0.0040	0.0040	0.0040	
Standard Dev	0.0178	0.0255	0.0249	0.0391	0.0600	0.0277	0.0139	0.0388	0.0244	0.0386	0.0224	0.0338	0.0316	0.0194	0.0535	0.0475	0.0535	0.0475	0.0236	0.0241	0.0187	0.0196	0.0195	0.0174	0.0143	0.0143	0.0143	0.0143	0.0143	
Sample Varia	0.0003	0.0007	0.0006	0.0015	0.0036	0.0008	0.0002	0.0015	0.0006	0.0015	0.0005	0.0011	0.0010	0.0004	0.0029	0.0023	0.0029	0.0023	0.0006	0.0006	0.0003	0.0004	0.0004	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	
Kurtosis	0.6927	-0.5058	-1.9835	0.4685	-0.0931	-0.7496	0.9187	0.4218	-0.8885	0.8007	-0.2360	0.8454	-0.7922	1.1535	0.7166	0.8126	0.7166	0.8126	0.7570	-1.8135	-0.6184	-0.0316	1.8492	-1.9208	-1.4423	-1.4423	-1.4423	-1.4423	-1.4423	
Skewness	-0.7035	-0.0696	-0.0688	0.4439	1.0963	-0.2554	1.0767	0.7041	-0.6545	-0.7304	-0.6028	0.7726	-0.0878	-0.9435	0.2590	0.9973	0.2590	0.9973	-0.5347	0.5039	-0.3846	-0.2483	1.0363	0.2525	0.0693	0.0693	0.0693	0.0693	0.0693	
Range	0.0526	0.0753	0.0624	0.1216	0.1582	0.0809	0.0396	0.1111	0.0665	0.1164	0.0627	0.1020	0.0867	0.0592	0.1696	0.1324	0.1696	0.1324	0.0739	0.0601	0.0532	0.0594	0.0605	0.0453	0.0388	0.0388	0.0388	0.0388	0.0388	
Minimum	-0.0276	-0.0201	-0.0206	-0.0480	-0.0270	-0.0335	-0.0009	-0.0299	-0.0278	-0.0567	-0.0292	-0.0312	-0.0247	-0.0084	-0.0519	-0.0227	-0.0519	-0.0227	-0.0507	-0.0269	-0.0209	-0.0203	-0.0263	-0.0166	-0.0108	-0.0108	-0.0108	-0.0108	-0.0108	
Maximum	0.0250	0.0552	0.0418	0.0737	0.1313	0.0475	0.0387	0.0812	0.0387	0.0596	0.0335	0.0708	0.0621	0.0508	0.1177	0.1097	0.1177	0.1097	0.0232	0.0332	0.0323	0.0391	0.0341	0.0287	0.0280	0.0280	0.0280	0.0280	0.0280	
Sum	0.0289	0.1324	0.0802	0.0527	0.1872	0.0625	0.0910	0.0913	0.0720	0.0858	0.0620	0.0705	0.1625	0.1909	0.2088	0.1567	0.2088	0.1567	-0.0688	-0.0076	0.0653	0.0817	-0.0200	0.0374	0.0656	0.0656	0.0656	0.0656	0.0656	
Count	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7

Table 2: Summary of the descriptive statistics of the sample's stocks' market adjusted returns.

The daily prices for the index S&P500 are also collected from the Refinitiv DataStream database. The index is used as a benchmark for the event study as it best represents the chosen companies. The S&P500 index has experienced a sharp decline since February 2022, which coincides with the Russian invasion of Ukraine.

5 Methodology

To evaluate the market sentiment and the impact of the start of the Russia-Ukraine conflict on the stock returns of American companies operating in the oil sector, a market adjusted return model is employed (FAMA, 1969). A market adjusted return model, often used in event studies, is designed to measure the impact of a specific event on the returns of a sample of stocks (Binder J. J., 1998). This model helps calculate the Abnormal Average Returns (AAR) and Cumulative Abnormal Returns (CAR) by comparing the returns of sample to the market returns (Binder J. J., 1998). In fact, this study employs an event study methodology, focusing on the calculation of AAR and CAR to measure the sample deviation from the market due to the event. A regression ran on excel is also used to test the statistical significance of AAR and CAR for the event date and the event window.

As explained in the previous Chapter, the event date is selected as the 24th of February 2022. The event window is set to (-3, +3) days before and after the event to better isolate its impact and focus closely on the period immediately surrounding the event, making it easier to attribute abnormal returns directly to the it. While longer event windows have an increased risk of confounding factors, a (-3, +3) event window reduces the chance of other events influencing the stock returns, thereby minimizing noise and increasing precision (Binder J. J., 1998). Also, according to the Efficient Market Hypothesis (EMH) (Fama, 1969), markets quickly incorporate new information into stock prices, therefore, significant price adjustments are expected to occur shortly after the event.

The computation of daily returns for each stock and the market are carried out as follows:

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} \quad (1)$$

$$R_{m,t} = \frac{P_{m,t} - P_{m,t-1}}{P_{m,t-1}} \quad (2)$$

Where:

- $R_{i,t}$ is the return on stock i on day t .
- $P_{i,t}$ is the price on stock i on day t .
- $R_{m,t}$ is the S&P500 return on day t (used as a proxy for the market index).
- $P_{m,t}$ is the S&P500 price on day t .

Abnormal Returns (AR) for each stock i on day t is the difference between the actual return and the market return:

$$AR_{i,t} = R_{i,t} - R_{m,t} \quad (3)$$

The average the abnormal returns across all stocks in the sample selected for each day in the event window is calculated as follows:

$$AAR_t = \frac{1}{N} \sum_{i=1}^N AR_{i,t} \quad (4)$$

Where:

- N is the number of stocks.

The sum the AAR over the event window is used to get the cumulative abnormal return:

$$CAR_{t_1,t_2} = \sum_{t=t_1}^{t_2} AAR_t \quad (5)$$

Where:

- t_1 and t_2 define the start and end of the event window.

To test the statistical significance of AAR and CAR, a regression analysis with a dummy variable (=1) is utilized. This equation represents the average impact of the event across the sample study at the event date. The regression is performed as follows:

$$AAR_t = \gamma D_t + \epsilon_t \quad (6)$$

Where:

- γ is the average abnormal return during the event window.
- D_t is the Dummy variable.

The following formula represents the regression used to calculate the statistical significance of the CAR is the following:

$$CAR_{i,t_1,t_2} = \sum_{t=t_1}^{t_2} AR_{i,t} = \gamma \sum_{t=t_1}^{t_2} D_t + \sum_{t=t_1}^{t_2} \epsilon_{i,t} \quad (8)$$

Where:

- D_t captures the effect of the event over the period from t_1 to t_2

The first hypothesis to be tested for both AAR and CAR is the null hypothesis ($\gamma D_t = 0$). If γD_t is significantly different from zero, then both AAR and CAR are significant.

6 Empirical Findings

6.1 Average Abnormal Returns

Figure 7 depicts the Average Abnormal Returns (AAR) for the sample of stocks relative to the S&P500 over a 7-day event window, spanning from 3 days before the event (Day -3) to 3 days after the event (Day +3). The AAR returns have been calculated as indicated in Chapter 5, by subtracting the market returns to the individual stock returns (3) and computing the average of the AR resulted from the previous calculations (4).

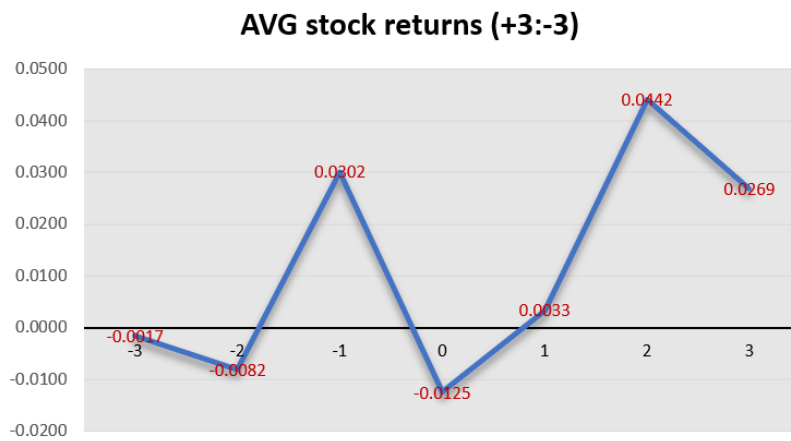


Figure 7: AAR (-3, +3).

The Pre-Event Period (Day -3 to Day -1) shows slightly negative AAR on day -3 and -2, indicating that the sample of stocks performed marginally worse than the S&P 500. On Day -1, there is a sharp recovery in AAR to 0.0302, showing a positive abnormal return just before the event suggesting that investors might have anticipated the event and reacted positively beforehand. On the event day (Day 0), the AAR drops to -0.0125, indicating an adverse immediate reaction to the event relative to the market. The Post-Event Period (Day +1 to Day +3) sees the stocks rebounding with continued positive abnormal returns during all the 3 days, suggesting that the initial negative reaction might have been overdone, with investors adjusting their expectations positively.

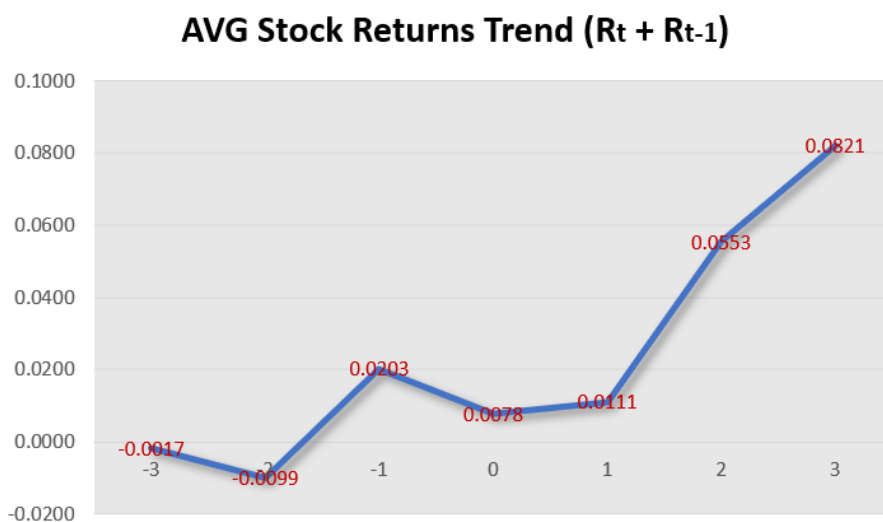


Figure 8: AAR (-3, +3) trend.

Figure 8 gives more clarity to the situation before and after the event, and the magnitude of the shock during the event date, by showing the trend of the AAR (based on the sum of the current return and the previous one). The figure confirms the magnitude of the negative reaction of the sample on the event day (Day 0), when the AAR dropped by -0.0125, followed by an almost immediate reaction with positive abnormal returns after the event.

The positive AAR before the event might reflect investor optimism or insider information about the event. The negative AAR on the event day indicates that the actual occurrence of the event was worse than anticipated and impacted the whole market. The strong positive AAR in the days following the event suggests a re-evaluation of the event's impact on the oil sector, leading to a positive reassessment of the stocks.

<i>Regression Statistics</i>	
Multiple R	0.43120305
R Square	0.18593607
Adjusted R Square	0.14048152
Standard Error	0.02678528
Observations	23

<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.003605	0.003605	5.024904	0.035915
Residual	22	0.015784	0.000717		
Total	23	0.019389			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	-0.012520	0.005585	-2.241630	0.035398	-0.024103	-0.000937	-0.024103	-0.000937

Table 3: Regression of the AAR on the event date.

The regression in Table 3 ran for the abnormal returns of the sample on the event date shows that the negative AAR is statistically significant. In fact, the P-value below 0.05 (0.03539) of the negative coefficient of the AAR (X Variable 1), which is the same value found in Figure 8 on day 0, proves Hypothesis 1 and highlights that the relationship between the dummy variable and the AAR is robust. Also, the F-statistic (5.0249) and the significance F (0.0359) indicate that the model is a good fit for the data and is statistically significant at the 5% significance level.

Table 4 presents the AAR for each day of the event window, for which regressions have been run and used analyze their statistical significance. Table 4 shows results that support the H2 as the significant positive abnormal returns are observed on days +2, and +3, indicating a positive sentiment about the performance of the sample after the event. However, day +1 is not statistically significant, meaning that this reaction wasn't immediate. Significant positive abnormal returns are also observed on days -1, supporting the theory suggesting that there might have been an anticipation of the event (mentioned in this Chapter 6.1, pp 32).

Event window	AAR	Obs
-3	(0.00166)	23
-2	(0.00819)***	23
-1	0.03015***	23
0	(0.01252)**	23
1	0.00333	23
2	0.04415***	23
3	0.02685***	23

Table 4: Statistical significance of the AAR of 23 stocks in the sample for each day in the event window. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively.

6.2 Cumulative Abnormal Returns

The Cumulative Abnormal Returns (CAR) have been calculated using the steps in Chapter 5, using the sum the AAR over the event window (5). The event window (-3, +3) is the one that has been primarily used because it better isolates the impact of the beginning of the conflict on the sample of stocks. By summing up the 7-days AAR of the sample and computing an average, the result for the ACAR is 0.082129 or 8.213%.

The statistical significance of the CAR is proved by running the regression in Table 2.5.

<i>Regression Statistics</i>	
Multiple R	0.7764653
R Square	0.6028983
Adjusted R Square	0.5574438
Standard Error	0.0681519
Observations	23

<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.1551391	0.1551391	33.4014245	0.0000098
Residual	22	0.1021831	0.0046447		
Total	23	0.2573222			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	0.082129	0.014211	5.779397	0.000008	0.052658	0.111600	0.052658	0.111600

Table 5: Regression of the CAR on the event window (-3, +3).

The regression model suggests that there is a statistically significant relationship between the CAR (X Variable 1) and the dependent variable as the very small p-value is considerably lower than 0.001. This means that the positive cumulative abnormal returns are statistically significant and explained by this model. The coefficient for CAR is positive (0.082129), confirming a positive relationship and supporting the H3.

7 Conclusion

The paper provides insights on the effects of the Russia-Ukraine conflict on the US oil sector through the analysis of the market sentiment through AAR and CAR of the sample of American oil companies' stock prices.

The literature review presents the role of sanctions and countersanctions as key factors in explaining the market behavior after the event date, as they had an impact on global markets, particularly in the energy sector (Baogui et al, 2023). This aligns with the market sentiment captured in the empirical findings, where the initial negative reaction to the event was quickly followed by a positive adjustment. Market players anticipated the market's reaction to the conflict and behaved as expected in the hypotheses, probably drawing on their experiences from similar geopolitical events, such as the annexation of Crimea in 2014. The swift recovery in AAR and the positive CAR in the days following the event suggest that investors expected the sanctions to disrupt energy supplies, benefiting American oil companies.

The empirical findings reveal an initial negative shock on the event date, followed by a swift positive adjustment, indicating investor optimism about the industry's profitability during the crisis. **Hypothesis 1** predicted a significant negative AAR on the event date, which was observed, likely due to the initial shock and uncertainty caused by the outbreak of the conflict. This negative reaction reflected immediate concerns about market volatility and disruptions in the global oil supply chain. **Hypothesis 2** predicted a subsequent positive AAR in the days following the event, which was also confirmed. This positive market sentiment can be attributed to the quick increase in oil prices. It is likely that investors recalibrated their expectations, recognizing the potential benefits for American oil companies in filling the gap left by Russian energy supplies. **Hypothesis 3** predicted a significant positive CAR over the entire event window (-3, +3), which was supported by the data, with the cumulative abnormal returns indicating sustained investor optimism. This optimism was likely driven by a re-evaluation of the US oil sector's importance in the context of shifting global energy trade patterns.

The confirmation of these hypotheses demonstrate that the market participants' expectations were sustainable, influenced by both the immediate impact of the conflict and the anticipated long-term shifts in global energy trade. These findings contribute to the broader understanding of how geopolitical events influence financial markets, particularly in industries integral to economic stability. The study also highlights the importance of timely market analysis in anticipating and responding to such disruptions.

References

- Adekoya O. B., Asl M. G., Oliyide J. A., Izadi P. (2023). *Multifractality and cross-correlation between the crude oil and the European and non-European stock markets during the Russia-Ukraine war*. Resources Policy, Vol. 80. Retrieved from: <https://doi.org/10.1016/j.resourpol.2022.103134>.
- Aharon D. Y., Qadan M. (2022) *Infection, invasion, and inflation: Recent lessons*. Finance Research Letters, Vol. 50. Retrieved from: <https://doi.org/10.1016/j.frl.2022.103307>.
- Ahmed S., Mostafa M. H. (2023). *Russia–Ukraine crisis: The effects on the European stock market*. European Financial Management. Retrieved from: <https://doi-org.proxy.uwasa.fi/10.1111/eufm.12386>.
- Åslund A. (2020). *Responses to the COVID-19 crisis in Russia, Ukraine, and Belarus*. Eurasian Geography and Economics. Vol. 61, pp. 532-545. Retrieved from: <https://doi-org.proxy.uwasa.fi/10.1080/15387216.2020.1778499>.
- Baogui X., Mengwei Z. (2023). *Evolutionary game on international energy trade under the Russia-Ukraine conflict*. Energy Economic, Vol. 125. Retrieved from: <https://doi.org/10.1016/j.eneco.2023.106827>.
- Binder J. J. (1998). *The event study methodology since 1969*. Review of Quantitative Finance and Accounting, Vol. 11, pp. 111-137. Retrieved from: <https://doi.org/10.1023/A:1008295500105>.

- Boubaker S., Nguyen N., Trinh, V. Q., Vu T. (2023). *Market reaction to the Russian Ukrainian war: a global analysis of the banking industry*, Review of Accounting and Finance, Vol. 22, pp. 123-153. Retrieved from: <https://doi-org.proxy.uwasa.fi/10.1108/RAF-10-2022-0294>.
- Chancharat S., Sinlapates P. (2023). *Dependences and dynamic spillovers across the crude oil and stock markets throughout the COVID-19 pandemic and Russia-Ukraine conflict: Evidence from the ASEAN+6*. Finance Research Letters, Vol. 57. Retrieved from: <https://doi.org/10.1016/j.frl.2023.104249>.
- Chen Y., Jiang J., Wang L., Wang R. (2023). *Impact assessment of energy sanctions in geo-conflict: Russian–Ukrainian war*, Energy Reports, Vol. 9, pp. 3082-3095. Retrieved from <https://doi.org/10.1016/j.egy.2023.01.124>.
- Cui J., Maghyereh A. (2023). *Higher-order moment risk connectedness and optimal investment strategies between international oil and commodity futures markets: Insights from the COVID-19 pandemic and Russia-Ukraine conflict*. International Review of Financial Analysis, Vol. 86. Retrieved from: <https://doi.org/10.1016/j.irfa.2023.102520>.
- D’Anieri P., Kuzio T. (2019). *Ukraine after five years of conflict*. Eurasian Geography and Economics. Vol 60, pp. 1538-7216. Retrieved from: <https://doi.org/10.1080/15387216.2019.1635512>.
- Gaio L. E., Stefanelli N. O., Pimenta T., Bonacim C. A. G., Gatsios R. C. (2022). *The impact of the Russia-Ukraine conflict on market efficiency: Evidence for the developed*

stock market. Finance Research Letters, Vol. 50. Retrieved from:

<https://doi.org/10.1016/j.frl.2022.103302>.

Gullstrand J. (2020). *What goes around comes around: The effects of sanctions on Swedish firms in the wake of the Ukraine crisis*. The World Economy. Vol. 43, pp. 2315-2342. Retrieved from: <https://doi-org.proxy.uwasa.fi/10.1111/twec.13000>.

Hosoe N. (2023). *The cost of war: Impact of sanctions on Russia following the invasion of Ukraine*. Journal of Policy Modeling, Vol. 45, pp. 305-319. Retrieved from: <https://doi.org/10.1016/j.jpolmod.2023.04.001>.

Kumar S., Jain R., Narain, Balli F., Billah M. (2023). *Interconnectivity and investment strategies among commodity prices, cryptocurrencies, and G-20 capital markets: A comparative analysis during COVID-19 and Russian-Ukraine war*. International Review of Economics & Finance, Vol. 88. pp. 547-593. Retrieved from: <https://doi.org/10.1016/j.iref.2023.06.039>.

Lyocsa S., Plíhal T. (2022). *Russia's ruble during the onset of the Russian invasion of Ukraine in early 2022: The role of implied volatility and attention*. Finance Research Letters, Vol. 48. Retrieved from: <https://doi.org/10.1016/j.frl.2022.102995>.

Makkonen T., Mitze T. (2023). *Geopolitical conflicts, sanctions and international knowledge flows: EU–Russia collaboration during the Ukraine crisis*. World Economy, Vol. 46, pp. 2926-2949. Retrieved from: <https://doi-org.proxy.uwasa.fi/10.1111/twec.13421>.

Martins A. M., Correia P., Gouveia R. (2023). *Russia-Ukraine conflict: The effect on European banks' stock market returns*, Journal of Multinational Financial Management, Vol. 67. Retrieved from:
<https://doi.org/10.1016/j.mulfin.2023.100786>.

Martins A. M., Correia P., Gouveia R. (2023). *The impact of the Russia–Ukraine war on the world's largest listed insurance firms*. The Geneva Papers on Risk and Insurance - Issues and Practice. Retrieved from: <https://doi.org/10.1057/s41288-023-00305-w>.

Naeem M. A., Hamouda F., Karim S., Vigne S. A. (2023). *Return and volatility spillovers among global assets: Comparing health crisis with geopolitical crisis*. International Review of Economics & Finance, Vol. 87, pp. 557-575. Retrieved from:
<https://doi.org/10.1016/j.iref.2023.06.008>.

Oikonomikou L. E. (2018). *Modeling financial market volatility in transition markets: a multivariate case*. Research in International Business and Finance. Vol. 45, pp. 307-322. Retrieve from: <https://doi.org/10.1016/j.ribaf.2017.07.163>.

Orenstein M. A., Kelemen R. D. (2016). *Trojan Horses in EU Foreign Policy*. Journal of Common Market Studies. Vol. 55, pp. 87-102. Retrieved from: <https://doi-org.proxy.uwasa.fi/10.1111/jcms.12441>.

Pak O., Kretschmar G. L. (2016). *Western sanctions—Only half the challenge to Russia's economic union*. Research in International Business and Finance. Vol. 38, pp. 577-592. Retrieved from: <https://doi.org/10.1016/j.ribaf.2016.07.009>.

Reinhar C., Rogoff K. (2009). *This Time Is Different: Eight Centuries of Financial Folly*.

Published by: Princeton University Press. Retrieved from:

<https://doi.org/10.2307/j.ctvcm4gqx>

Roy A., Soni A., Deb S. (2023). *A wavelet-based methodology to compare the impact of pandemic versus Russia–Ukraine conflict on crude oil sector and its*

interconnectedness with other energy and non-energy markets. *Energy Economics*,

Vol. 124. Retrieved from: <https://doi.org/10.1016/j.eneco.2023.106830>.

Si Mohammed K., Tedeschi M., Mallek S., Tarczyńska-Łuniewska M., Zhang A. (2023).

Realized semi variance quantile connectedness between oil prices and stock

market: Spillover from Russian-Ukraine clash. *Resources Policy*, Vol. 85. Retrieved

from: <https://doi.org/10.1016/j.resourpol.2023.103798>.

Van Bergeijk P. (2022). *Sanctions Against the Russian War on Ukraine: Lessons from*

History and Current Prospects. *Journal of World Trade*, pp. 571-586, Retrieved

from: [https://kluwerlawonline-](https://kluwerlawonline-com.proxy.uwasa.fi/journalarticle/Journal+of+World+Trade/56.4/TRAD2022023)

[com.proxy.uwasa.fi/journalarticle/Journal+of+World+Trade/56.4/TRAD2022023](https://kluwerlawonline-com.proxy.uwasa.fi/journalarticle/Journal+of+World+Trade/56.4/TRAD2022023).

Wu T., An F., Gao X., Wang Z. (2023). *Hidden causality between oil prices and exchange*

rates. *Resources Policy*, Vol. 82. Retrieved from:

<https://doi.org/10.1016/j.resourpol.2023.103512>.