

**THE IMPACT OF RUSSIA-UKRAINE INVASION ON OIL AND  
GAS STOCKS IN 7 COUNTRIES BY USING EVENT STUDY  
APPROACH**

**FINAL PROJECT**

**By**

**Roos Amelya**

**19019132**



**Undergraduate Program**

**School of Business and Management**

**Institut Teknologi Bandung**

**2022**

*This page is intentionally left blank*

# **THE IMPACT OF RUSSIA-UKRAINE INVASION ON OIL AND GAS STOCKS IN 7 COUNTRIES BY USING EVENT STUDY APPROACH**

**Roos Amelya**  
**19019132**

Bachelor of Management Program, School of Business and Management  
Institut Teknologi Bandung, 2022

**Supervisor: Mandra Lazuardi Kitri, ST., MBA**

## **ABSTRACT**

The purpose of this research is to analyze the effect of the announcement of Russia-Ukraine invasion on the market reaction as reflected in abnormal returns and trading volume activity in 7 countries, namely Saudi Arabia, USA, Canada, UAE, Nigeria, Kuwait, and Norway. This research uses secondary data and there are 29 firms of oil and gas listed in each state as a total sample for this research. This research employs the event study method. The event window is 5 days before and 5 days after the occurrence, and the estimating period is 100 days. Normality test analysis and statistical hypothesis testing were carried out in this study. The results showed that there is no significant difference in abnormal returns but there was a significant difference in trading volume before and after the announcement of the event. This result is supported by the results of the analysis based on countries that are not members of OPEC, countries with semi-strong form of efficient market, and countries with weak form of efficient market as comparisons.

**Keywords:** Russia-Ukraine invasion, market reaction, oil and gas, abnormal return, trading volume activity

*This page is intentionally left blank*

# THE IMPACT OF RUSSIA-UKRAINE INVASION ON OIL AND GAS STOCKS IN 7 COUNTRIES BY USING EVENT STUDY APPROACH

Roos Amelya  
19019132

Program Sarjana Manajemen, Sekolah Bisnis dan Manajemen  
Institut Teknologi Bandung, 2022

**Dosen Pembimbing: Mandra Lazuardi Kitri, ST., MBA**

## ABSTRAK

Tujuan dari penelitian ini adalah untuk menganalisis pengaruh pengumuman invasi Rusia-Ukraina terhadap reaksi pasar yang tercermin dari abnormal return dan trading volume activity di 7 negara yaitu Arab Saudi, Amerika Serikat, Kanada, UAE, Nigeria, Kuwait, dan Norwegia. Penelitian ini menggunakan data sekunder dan ada 29 perusahaan minyak dan gas yang terdaftar di setiap negara bagian sebagai sampel total untuk penelitian ini. Penelitian ini menggunakan metode event study. Jendela kejadian adalah 5 hari sebelum dan 5 hari setelah kejadian, dan periode perkiraan adalah 100 hari. Analisis uji normalitas dan uji hipotesis statistik dilakukan dalam penelitian ini. Hasil penelitian menunjukkan bahwa tidak terdapat perbedaan abnormal return yang signifikan namun terdapat perbedaan yang signifikan pada volume perdagangan sebelum dan sesudah pengumuman event. Hasil ini didukung oleh hasil analisis berdasarkan negara-negara yang bukan anggota OPEC, negara-negara dengan bentuk pasar efisien semi-kuat, dan negara-negara dengan bentuk pasar efisien yang lemah sebagai pembandingan.

**Kata kunci:** Invasi Rusia-Ukraina, reaksi pasar, minyak dan gas, *abnormal return*, aktivitas volume perdagangan

*This page is intentionally left blank*

**APPROVAL PAGE**

**THE IMPACT OF RUSSIA-UKRAINE INVASION ON OIL AND  
GAS STOCKS IN 7 COUNTRIES BY USING EVENT STUDY  
APPROACH**

**By  
ROOS AMELYA**

**ID No: 19019132**

**A Final Project in Partial Fulfilment  
of the Requirement for the Degree of Bachelor of Management**

**Undergraduate Program of Management Study**

**School of Business and Management**

**Institut Teknologi Bandung**

**2 August 2022**

**Approved By**



---

**Mandra Lazuardi Kitri, ST., MBA**

*This page is intentionally left blank*



## FOREWORD

All praise and gratitude goes to Allah SWT, for His blessings and grace, the research entitled The Impact of the Russia-Ukraine Invasion on Oil and Gas Stocks in 7 Countries by Using the Event Study Approach was successfully completed.

This final project is made to apply research knowledge while studying at SBM-ITB. This research may still have many shortcomings due to the limited ability and knowledge of the researcher. Therefore, the authors apologize for the shortcomings that exist in this study, besides that the authors also expect constructive criticism and suggestions to improve this research.

During the completion of this research, there has been a lot of support and assistance that has helped researchers both directly and indirectly. Therefore, the researcher would like to express his deepest gratitude to all those who have helped, especially to:

1. Mr. Mandra Lazuardi Kitri, as the supervisor of this final project for her support, guidance and kindness in providing suggestions to improve this research until the end of this project.
2. The researcher's beloved family, Papah and Mamah, for their continuous prayers, kindness and support for me every day. Also to my two dearest brothers, Perkasa Jaka Deviandy and Roos Eliza Putri who have encouraged me, supported me, motivated me, and gave words of encouragement in everything I do in my life.
3. To Syamsi Fam, thank you for all your prays, supports, and especially Mba Mira who accompanied me for weeks at home to complete this thesis.
4. To all Bubuhan members: Sasa, Nadia, Pude, Dape, Tiara, Fania, Nindy, Tisha, and Fiona. Thank you for always supporting and accompanying me through ups and downs during the process of this final project. Thank you for listening to my complaints and comforting me. I love you guys <3. Also, For my beloved friends Amanda, Audy, Pepe, Aney, and Dany thank you for accompanying me in the process of working on this thesis, you never stop giving words of encouragement when I was down.
5. To Irvan, thank you for the encouragement to make me more confident in myself in making this final project, and thank you for always cheering me up when I was tired.

Thank you to all SBM 2022, and all ITB friends who have given me experience for these 3 years. Good luck to all of us!

Love,  
Roos Amelya

*This page is intentionally left blank*

## LIST OF CONTENTS

|                                                           |      |
|-----------------------------------------------------------|------|
| ABSTRACT .....                                            | iii  |
| ABSTRAK .....                                             | v    |
| APPROVAL PAGE .....                                       | vii  |
| FOREWORD.....                                             | ix   |
| LIST OF CONTENTS.....                                     | xi   |
| LIST OF FIGURES.....                                      | xiii |
| LIST OF TABLES .....                                      | xv   |
| LIST OF EQUATION.....                                     | xvii |
| CHAPTER 1.....                                            | 1    |
| INTRODUCTION.....                                         | 1    |
| 1.1    Background .....                                   | 1    |
| 1.2    Problem Statement .....                            | 3    |
| 1.4    Research Objectives .....                          | 5    |
| 1.5    Scope and Limitations .....                        | 5    |
| 1.6    Research Outline .....                             | 5    |
| CHAPTER 2.....                                            | 7    |
| THEORETICAL FOUNDATION .....                              | 7    |
| 2.1    Capital Market.....                                | 7    |
| 2.2    Efficient Market Hypothesis .....                  | 8    |
| 2.2.1    Abnormal Return.....                             | 11   |
| 2.2.2    Trading Volume Activity .....                    | 12   |
| 2.3    Previous Research .....                            | 13   |
| 2.4    Hypothesis Development .....                       | 15   |
| 2.4.1    The Differences in Abnormal Return.....          | 15   |
| 2.4.2    The Differences in Trading Volume Activity ..... | 17   |
| CHAPTER 3.....                                            | 19   |
| RESEARCH METHODOLOGY .....                                | 19   |
| 3.1    Data Collection.....                               | 20   |
| 3.1.1    Population and Sample.....                       | 20   |
| 3.1.2    Type and Source of Data .....                    | 23   |
| 3.2    Event Study .....                                  | 24   |

|                               |                                                                                      |    |
|-------------------------------|--------------------------------------------------------------------------------------|----|
| 3.3                           | Data Analysis .....                                                                  | 26 |
| 3.3.1                         | Calculating Abnormal Return .....                                                    | 27 |
| 3.3.2                         | Calculating Trading Volume Activity .....                                            | 28 |
| 3.3.3                         | Conducting Statistical Test .....                                                    | 29 |
| CHAPTER 4                     | .....                                                                                | 31 |
| DATA ANALYSIS                 | .....                                                                                | 31 |
| 4.1                           | Descriptive Statistic .....                                                          | 31 |
| 4.1.1                         | Descriptive Statistic for Abnormal Return of 7 Countries.....                        | 31 |
| 4.1.2                         | Descriptive Statistic for Average Abnormal Return of OPEC – Non OPEC<br>31           |    |
| 4.1.3                         | Descriptive Statistic for Average Abnormal Return of EMH Categories... 32            |    |
| 4.1.4                         | Descriptive Statistic for Average Trading Volume Activity of 7 Countries<br>33       |    |
| 4.1.5                         | Descriptive Statistic for Average Trading Volume Activity of OPEC – Non<br>OPEC 34   |    |
| 4.1.6                         | Descriptive Statistic for Average Trading Volume Activity of EMH<br>Categories ..... | 34 |
| 4.2                           | Abnormal Return .....                                                                | 35 |
| 4.2.1                         | Normality Test .....                                                                 | 35 |
| 4.2.2                         | Statistical Hypothesis Test.....                                                     | 37 |
| 4.3                           | Trading Volume Activity.....                                                         | 39 |
| 4.3.1                         | Normality Test .....                                                                 | 39 |
| 4.3.2                         | Statistical Hypothesis Test.....                                                     | 41 |
| 4.4                           | Result Discussion.....                                                               | 44 |
| CHAPTER 5                     | .....                                                                                | 47 |
| CONCLUSION AND RECOMMENDATION | .....                                                                                | 47 |
| 5.1                           | Conclusion .....                                                                     | 47 |
| 5.2                           | Recommendation .....                                                                 | 48 |
| APPENDIX A                    | .....                                                                                | 54 |

## LIST OF FIGURES

|                                                                                                                  |    |
|------------------------------------------------------------------------------------------------------------------|----|
| Figure 1 Oil Prices Soar .....                                                                                   | 2  |
| Figure 2 Sources of Data Relation to the Efficient or Not Efficient Capital Market<br>Based on Levy (1996) ..... | 10 |
| Figure 3 Research Design.....                                                                                    | 19 |
| Figure 4 Research Period .....                                                                                   | 26 |
| Figure 5 Average Abnormal Return Daily of 7 Countries .....                                                      | 31 |
| Figure 6 Average Abnormal Return Daily of OPEC and Non OPEC.....                                                 | 32 |
| Figure 7 Average Abnormal Return Daily of EMH Categories.....                                                    | 33 |
| Figure 8 Average Trading Volume Activity Daily of 7 Countries.....                                               | 33 |
| Figure 9 Average Trading Volume Activity of OPEC - Non OPEC .....                                                | 34 |
| Figure 10 Average Trading Volume Activity Daily of EMH Categories .....                                          | 35 |

*This page is intentionally left blank*

## LIST OF TABLES

|                                                                                            |    |
|--------------------------------------------------------------------------------------------|----|
| Table 1 Result of Previous Research.....                                                   | 14 |
| Table 2 List of Countries.....                                                             | 20 |
| Table 3 List of Stocks.....                                                                | 21 |
| Table 4 List of Countries of OPEC and Non OPEC .....                                       | 22 |
| Table 5 List of Countries based on Efficient Market Form .....                             | 23 |
| Table 6 Average Abnormal Return Before and After Invasion of 7 Countries.....              | 31 |
| Table 7 Average Abnormal Return Before and After Invasion of OPEC-Non OPEC ..              | 31 |
| Table 8 Average Abnormal Return Before and After Invasion of EMH Categories .....          | 32 |
| Table 9 Average Trading Volume Activity Before and After Invasion of 7 Countries .         | 33 |
| Table 10 Average Trading Volume Activity Before and After Invasion of OPEC - Non OPEC..... | 34 |
| Table 11 Average Trading Volume Activity Before and After Invasion of EMH Categories.....  | 34 |
| Table 12 Normality Test for AAR of 7 Countries.....                                        | 35 |
| Table 13 Normality Test for AAR of OPEC - Non OPEC .....                                   | 36 |
| Table 14 Normality Test for AAR of EMH Categories .....                                    | 36 |
| Table 15 Statistical Hypothesis Test for AAR of 7 Countries .....                          | 37 |
| Table 16 Statistical Hypothesis Test for AAR of OPEC.....                                  | 37 |
| Table 17 Statistical Hypothesis Test for AAR of Non OPEC.....                              | 38 |
| Table 18 Statistical Hypothesis Test for AAR of Semi-Strong.....                           | 38 |
| Table 19 Statistical Hypothesis Test for AAR of Weak .....                                 | 39 |
| Table 20 Statistical Hypothesis Test for AAR of Inefficient .....                          | 39 |
| Table 21 Normality Test for ATVA of 7 Countries .....                                      | 39 |
| Table 22 Normality Test for ATVA of OPEC - Non OPEC.....                                   | 40 |
| Table 23 Normality Test for ATVA of EMH Categories .....                                   | 40 |
| Table 24 Statistical Hypothesis Test for ATVA of 7 Countries.....                          | 41 |
| Table 25 Statistical Hypothesis Test for ATVA of OPEC .....                                | 42 |
| Table 26 Statistical Hypothesis Test for ATVA of Non OPEC .....                            | 42 |
| Table 27 Statistical Hypothesis Test for ATVA of Semi-Strong.....                          | 43 |
| Table 28 Statistical Hypothesis Test for ATVA of Weak.....                                 | 43 |
| Table 29 Statistical Hypothesis Test for ATVA of Inefficient .....                         | 43 |
| Table 30 Statistical Hypothesis Conclusion.....                                            | 44 |

*This page is intentionally left blank*



## LIST OF EQUATION

|                 |    |
|-----------------|----|
| Equation 1..... | 27 |
| Equation 2..... | 27 |
| Equation 3..... | 27 |
| Equation 4..... | 28 |
| Equation 5..... | 28 |
| Equation 6..... | 28 |
| Equation 7..... | 28 |
| Equation 8..... | 29 |

*This page is intentionally left blank*

# CHAPTER 1

## INTRODUCTION

### 1.1 Background

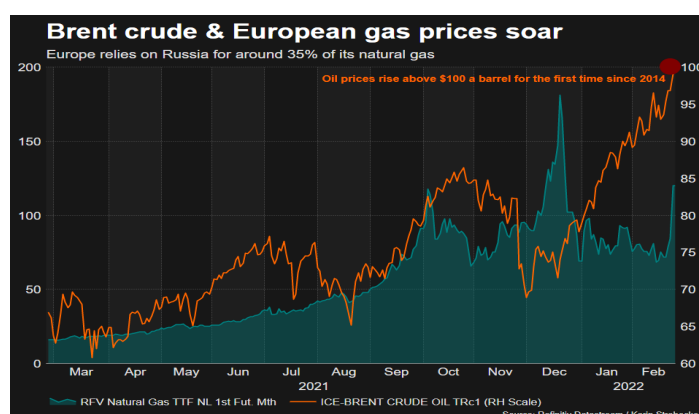
The goal of investors is to generate a profit from their present investment within a certain amount of time in the foreseeable future. This profit is referred to as an expected return. They expect to achieve the highest possible profit while taking the fewest possible risks. According to Markowitz (1952), an efficient investment is an investment that offers a predetermined risk in return for a maximum rate of return, or a predetermined rate of return in return for a minimum level of risk. Investors have the option of using either fundamental analysis or technical analysis when making investments in the stock market. These are the two types of investment analysis. Investors do fundamental analysis by researching the operations of a company in order to collect data on the profitability of that firm, which can then be used to produce fresh insights into the value of that company's shares. During the process of technical analysis, investors investigate historical stock prices as well as the patterns of seasonal change that are formed by cycles of change in stock prices.

In the capital market, investors can diversify their investments by forming portfolios according to the expected returns and the risks they are willing to bear. However, the stock market, on the other hand, is not a reliable market. It is impacted by events, regardless of whether such events are connected to the economy or not. It's possible that the events that take place will provide hints of information for investors. If the information has the potential to affect the response of the market, then we may say that it is relevant. The impacts of non-economic events cannot be separated, despite the fact that these occurrences are not directly tied to the activities that take place on the capital market. One of them is a political issue that often easily affects stock price fluctuations on stock exchanges around the world (Nurhaeni, 2009).

On February 24, the global stock market fell sharply as investors woke to the news that Russian troops had entered Ukraine in the early hours of the morning 5 A.M. The FTSE 100 in London plummeted by 3.9 percent, while the CAC 40 in France lost 3.8 percent, and the DAX 30 in Germany sank by 4 percent. The value of US

stocks went down dramatically. With a loss of 0.2 percent to start the day, the Nasdaq Composite Index entered a bear market. The Dow fell by 1.9 percent, which is equivalent to 675 points. The S&P 500 index saw a loss of 1.2 percent. In Asia, the Hong Kong Hang Seng Index (HSI) saw its largest daily loss in the last five months, falling by 3.2 percent. The Nikkei 225 (N225) index in Japan had a loss of 1.8 percent, while the Shanghai Composite index in China dropped down by 1.7 percent. As one of the member countries of the G20 which is an association of 20 countries with the largest economies in the world, of course, both directly and indirectly will have an impact on the world economy.

In addition, Russia's invasion of Ukraine also led to an increase in world commodity prices, one of which was oil and gas. Also, Oil and Gas as the most valuable industries in the global scale even it is estimated in 2022 that world revenues generated by the oil and gas business will amount to approximately \$5 trillion (www.ibisowrld.com, 2022). Plus, Russia is the third-largest producer of oil worldwide, accounting for over 12% of global crude oil production (Statista, 2021). Also, as the second largest producer of natural gas in the world, behind the United States, and has the largest gas reserves in the world. (IEA, 2021). Then, as soon as Russia invaded Ukraine, world oil prices soared beyond US\$ 100 per barrel that can be seen in Figure 1. A prolonged political crisis will certainly make crude oil prices skyrocket and of course will have a serious impact on the global economy. Natasha Kaneva, Head of Global Commodities Strategy J.P. Morgan said any disruption to Russian oil supplies could lead to a rise in oil prices to \$120 per barrel and a halving of Russian oil exports would push Brent oil prices to \$150 per barrel (CNBC Indonesia, 2022). However, not only world oil prices rose but also Asia-Pacific, European, and Wall Street stocks plunged immediately.



**Figure 1 Oil Prices Soar**

(Source: reuters.com)

From occurrence above, political events, such as military invasions and terrorist attacks, have become a key variable in the performance of capital markets as a result of the current atmosphere of conflict and confrontation around the world. It can be observed in the financial literature that there is increasing emphasis being placed on the influence of socio-political events on stock market behavior, and it has been shown, in general, that major events such as war and terrorism affect capital markets (Kollias, et al., 2011; Bash and Alsaifi, 2019; Papakyriakou, et al., 2019). Also, previous studies have shown a number of significant events that affect stock market returns. These include political uncertainty (Hillier & Loncan, 2019) and terrorist attacks (Goel et al., 2017).

However, as far as the authors are aware, there have been no studies exploring the impact of the Ukrainian-Russian conflict on the return of oil and gas companies. If abnormal returns are used, it can be said that an announcement that contains information will provide abnormal returns to the market. Conversely, those that do not contain information will not provide abnormal returns to the market (Jogiyanto, 2008).

In addition to using abnormal returns, market reactions to information can also be seen through the parameters of the movement of trading activity in the market or known as Trading Volume Activity, where if investors assess an event information, the event will result in the above trading decisions. ordinary trading decisions. The market reaction as an information signal about a certain event can affect the value of the company which can prevent changes in stock prices and trading volumes that occur (Budiarto & Baridwan, 2009). Since investors can also make observations about trading volume information associated with stock prices. Therefore, the purpose of this research is to make an effort to see the market reaction regarding the announcement of the Russian-Ukraine invasion using abnormal returns and trading volume activity.

## **1.2 Problem Statement**

Political events that occur in a country have a significant influence on the stability of the country and can also affect the reaction of the stock market. If the event is considered a positive sentiment, investors will respond by buying more shares, whereas if the event is considered a negative sentiment, investors will start selling their shares. Recently an event happening in the world was the Russian-Ukrainian

invasion. One of the biggest impacts of this attack was the soaring price of oil and gas due to fears of supply constraints. While a reduction in the amount of oil exported from Russia could cause the price of oil to rise to \$120 per barrel, and where such a reduction would cause the price of Brent oil to rise to \$150 per barrel each. Thus, with the increase in oil and gas prices, it gives a signal to the market that oil and gas producing countries will gain additional benefits due to the limited supply of oil and gas which is the impact of the Russia-Ukraine dispute.

In this study, the authors investigate whether oil and gas companies from several countries that are the largest oil and gas producers globally experience significant differences in abnormal return activity and trading volume before and after the announcement of the Russian-Ukraine invasion in 7 countries. Then, from the seven countries, subsampling was carried out with the aim of whether there were different results if these 7 countries were separated by categories, where the first sub-sampling of 7 countries was separated into two categories, namely countries that are OPEC members and Non-OPEC members. Then, the second sub-sampling of 7 countries was separated into three categories based on the level of efficiency of their market form.

Changes in trading volume activity (TVA) will be used to indicate the market's response to the information. TVA is one of the indicators used in technical analysis to evaluate stock prices and is used to determine the capital market response to information based on the characteristics of trading volume movements in the capital market (Nur & Dadan, 2017). To find out the volume of data trading activity of shares outstanding and the number of shares outstanding. Then, to find out the abnormal return data needed from historical the stock price of a security.

### **1.3 Research Questions**

From the previous discussion related to the problem above, the author comes up with the question as follows:

1. Is there a reaction on the market that is evidenced by significant differences in abnormal return before and after Russia invades Ukraine?
2. Is there a reaction on the market that is evidenced by significant differences in trading volume activity before and after Russia invades Ukraine?

## **1.4 Research Objectives**

This research has objective to determine the market reaction by analyze significant differences of abnormal return and trading volume activity before and after the event.

## **1.5 Scope and Limitations**

This research will limit its analysis to only include publicly listed oil and gas companies. These companies are listed in countries that are large oil and gas exporters on a global scale. To answer the research questions, this research will focus on abnormal return activity and trading volume activity to find out the market reaction on oil and gas stocks to the Russia-Ukraine invasion.

## **1.6 Research Outline**

This document will be split up into five primary sections, each of which will be discussed in more detail below.

### **CHAPTER 1: Introduction**

This chapter will describe the background of the problem which will describe the importance of the research topic to be discussed, then the main issues to be discussed in the research, research objectives that contain answers to the existing problems will be continued.

### **CHAPTER 2: Theoretical Foundation**

This chapter will describe the theory related to this research, the results of a literature review from various sources, namely the theory regarding the efficient market hypothesis, abnormal returns, trading volume activity. This chapter will also explain and describe previous studies related to research topics that continue to develop hypotheses.

### **CHAPTER 3: Research Methodology**

This chapter provides an overview of the approaches that will be used throughout the process to meet the issue and achieve the objectives of the research. To begin, the techniques of data collecting, data processing, and data analysis that were used by the author will be discussed. Event study is going to be used as the approach for carrying out this research.

## **CHAPTER 4: Data Analysis**

This chapter presents the findings obtained from the computations performed on the stock returns and the trading volume activities. This chapter also presents the findings of assessing the significant difference of anomalous return and trading volume activity before and after the announcement that Russia had invaded Ukraine. These data indicate how the market reacted to the news that Russia had invaded Ukraine.

## **CHAPTER 5: Conclusion and Recommendation**

The discussion regarding the research could be found in this chapter. Following the completion of the data analysis, a discussion will be held on each of the research questions. And at the end, there will also be a discussion of the conclusion.



## CHAPTER 2

### THEORETICAL FOUNDATION

#### 2.1 Capital Market

The capital market, commonly known as the stock exchange, is a sort of market that brings together investors for the purpose of selling or buying assets. The stock market is also capable of performing the role of an intermediate institution. This function demonstrates the significant role that the capital market plays in the maintenance of the economy since the capital market has the ability to link parties who are short on funds with parties that have an excess of funds. In addition to this, the capital market has the potential to inspire the development of effective methods for allocating funds.

The definition of the capital market is a market for trading assets that normally have a lifetime of more than one year, such as stocks and bonds (Tandelilin, 2010). In other words, the capital market is a market for long-term investments. The capital market may be broken down into four categories (Sunariyah, 2006) as follows:

a. Primary market

A market in which shares or other securities are sold for the first time before the shares are listed on an exchange. The share price is determined by the underwriter and the company that will go public (issuer), based on the fundamental analysis of the company concerned. In addition, the role of the underwriter in the primary market is to sell shares to the public as potential investors. In the primary market, the proceeds from the sale of these shares are included as company capital.

b. Secondary market

The secondary market is a market that trades shares and other securities widely, after going through a period of sale in the primary market. The stock price in the secondary market is determined by the demand and supply between buyers and sellers. The amount of demand and supply is influenced by the company's internal factors and the company's external factors. In the secondary market, the proceeds from the sale of shares here usually no longer

enter the company's capital, but go into the cash of the shareholders concerned.

c. Third market

The third market is a place for trading shares or other securities outside the exchange (over the counter market). Parallel exchange is a securities trading system that is organized outside the official stock exchange, in the form of a secondary market which is regulated and implemented by the Money and Securities Trading Union with supervision and guidance from the Capital Market Supervisory Agency. So, in this third market, there is no central trading location called the trading floor.

d. Forth market

The fourth market is a form of securities trading between investors or in other words the transfer of shares from one shareholder to another without going through a securities broker. This form of transaction in this kind of trade is usually carried out in large quantities (block sale).

## 2.2 Efficient Market Hypothesis

Event study is the methodology that is used the amount of times to examine market efficiency. Event studies are aimed to evaluate how the market reacts to the excess returns that are associated with certain information announcement events (Damodaran, 2002:117). As a result, it is essential to have an understanding of the concept of the market based on the hypothesis of the efficient market.

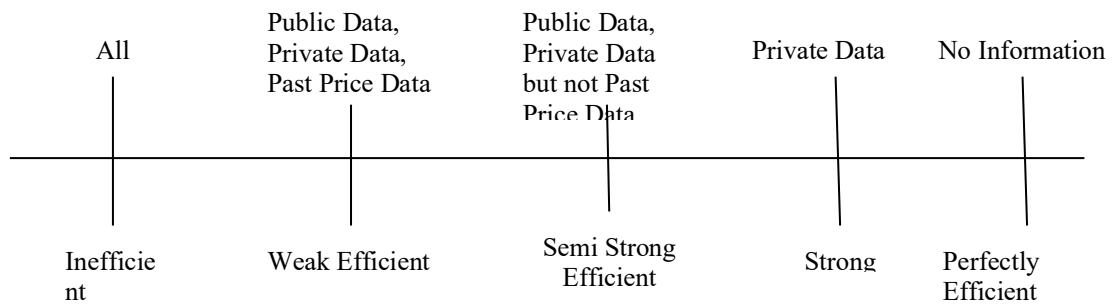
Eugene Fama (1970) developed the Theory of Efficient Markets, which expands on the theoretical foundation given by this approach. The Efficient Market Hypothesis (EMH) asserts that the price of an asset instantaneously reflects all of the information that is available. Changes in the price of a security may be clearly correlated with the event that is being considered if the EMH is accepted and it is established that there is not another event that is complicating the analysis. As a consequence, the price of newly issued securities may be seen to be the product of a re-evaluation that takes into account all of the new information (Fama, 1970). If the price reacts quickly and objectively to any new information that enters the market, then some experts believe that the market is efficient (Makiel, 1989).

The form of an efficient market is divided into three categories of EMH, namely as follows: (Fama, 1970).

- a. Efficient in the weak form, which is a state where all information in the past is a reflection of prices that are formed now. Thus, historical information such as price and trading volume and past events cannot be used to predict future price changes, as they are already at current prices. Under these circumstances, investors cannot obtain above-normal profit levels by using trading rules based on past price information (Husnan, 2005).
- b. Efficient in the form of semi strong, which is a condition in which the price formed now reflects the history and all information obtained (for example dividends, announcements of stock splits, issuance of new shares, financial difficulties experienced by the company, and other public events impact on the company's future cash flows). In a semi-strong form of efficient market, abnormal returns only occur around the announcement (publication) of an event as a representation of the market's response to the use. A semi-strong efficient market is said to be efficient if the information forms or responds quickly by the market (within one to two days or around).
- c. Efficient in strong form, which is a condition in which current security prices reflect all historical information, current information, and unpublished information. In a strong form efficient market, no investor can earn abnormal returns.

In this case Levy (1996) describes quite clearly about how the relationship between information and efficient markets. From what can be seen in Figure 2, based on the level, information can be divided into five groups. Meanwhile, based on the level of efficiency, the market can be grouped into five groups, where the market group with the lowest efficiency is called an inefficient market, while the highest level is a perfectly efficient market. When related to the relationship between the level of information and the level of market efficiency, it is clear that the five groups in each section correspond to each other. For example, the market is said to be inefficient when all available and available information can be used to obtain abnormal returns in the market. It is said to be a perfect efficient market if there is no information that can be used to obtain abnormal returns in the market.

## Information



## Efficiency Level

**Figure 2 Sources of Data Relation to the Efficient or Not Efficient Capital Market Based on Levy (1996)**

Researchers often try to test the efficiency of the market in each country, as is the case with Asiri and Alzeera (2013) who examined the Saudi Arabian Tadawul market in each sector which was found to be closer to the efficiency properties of the weak form of EMH. Thus, it is not expected that any investor in the Saudi Arabian market will be able to generate excessive profits simply by relying on past information and technical analysis to formulate trading decisions that beat the market on a continuous and sustainable basis.

Furthermore, Sabbaghi and Sabbaghi (2018) examined the efficiency of established markets during the current global financial crisis. According to the MSCI Market Classification Framework, there are a total of 23 developed markets, which include nations such as Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom, and the United States. Most established markets are found to demonstrate weak-form market efficiency, with the exception of Ireland, Sweden, and the United States. It was also discovered that the TSX has a market with a weak level of efficiency (Alexeev and Tapon, 2011).

Then, according to Seyhun (1986), stocks in the United States are semi-strong form efficient because insiders cannot benefit from public knowledge regarding insider trading. Moustafa (2004) examines the behavior of stock prices in the United Arab Emirates (UAE) stock market. The data is in the form of daily prices of 43 stocks included in the Emirates market index during the period October 2, 2001 to September 1, 2003. The returns of the 43 sample stocks do not follow a

normal distribution, so this research uses only a nonparametric process to test for randomness. The results reveal that the returns of 40 stocks out of 43 stocks are random at a 5% significance level. Therefore, empirical studies support the weak form of EMH of the UAE stock market.

Ajao and Osayuwu (2012) tested the weak form of the efficient market hypothesis in the Nigerian capital market. The scope of the research consists of all the securities traded on the floor of the Nigerian Stock Exchange. They conclude that the price changes of shares traded on the floor of the Nigerian Capital Market are independent and random. This means that the Nigerian Capital Market is efficient in a weak form. de Villiers (2000) From empirical findings show that KSE is informationally inefficient at the weak form level, indicating that prudent investors will realize abnormal returns using historical data on stock prices and trading volumes.

### 2.2.1 *Abnormal Return*

A Difference between actual return and the expected return is the definition of abnormal return (Hartono, 2003). According to Wirajaya (2011), abnormal return is a proxy of market response. If there is information about the event that is being watched, then the abnormal return will follow the event. However, if the event does not have any information content, then the event does not produce an abnormal return. Brown and Warner (1980) found that a stock's price performance is only abnormal in reference to a certain benchmark. As a result, in order to assess an abnormal return, it is necessary to first test a model that produces normal returns.

There are 3 models for estimating the expected return, which are Mean-adjusted Model, Market Model, and Market Adjusted Model (Tandelilin, 2010) the detail explanation of 3 models for estimating the expected return as follows:

#### a. Mean-adjusted Model Abnormal Return

This mean-adjusted model operates on the assumption that the predicted return has a constant value that is identical to the average return that was actually obtained in the estimation period.

b. Market Model Abnormal Return

Using this particular market model, the calculation of the expected return is carried out in two stages, the first of which involves forming the expected model by making use of actual data during the estimation period, and the second of which involves making use of this expected model to estimate the expected return during the event window. Stock returns are impacted by market portfolio profits in this model, and this technique has been used to calculate predicted returns in previous event studies because it can regulate how stock returns and market returns are linked together. In addition, this method enables the risk to change depending on the stock that is linked with it.

c. Market Adjusted Abnormal Return

This model assumes that the best estimator for estimating the return of a security is to use the market index return at that time. By using this model, it is no longer necessary to use the estimation period, because the estimated security return is the same as the market index return.

In order to carry out this research, the author will be using one of the three mentioned methods, the market model abnormal return. Brown and Warner (1980) discovered that market models function effectively under a wide range of circumstances. When compared to the utilization of two other models that only depict market circumstances without taking into account risk considerations for securities, the use of models that focus on abnormal market return is the more desirable option. In addition, the market model is more often used by previous research. This is owing to the fact that market models reflect the market circumstances of each investment while also taking into account risk variables.

### 2.2.2 *Trading Volume Activity*

Because trading volume truly depicts the meeting between supply and demand for stock transactions, it is often used as a tool to evaluate the movement of stock (Saputra, et al., 2021). The volume of trades is another factor that is considered when determining if a trend will continue or turn around. It is common practice for stock prices to rise in response to an increase in the amount of trading activity.

The fact that the stock has a high trading volume also indicates that it is in high demand among investors. In-demand investor stock expects large profits (Azis et al., 2015).

According to Charles P (1986), trading volume activity is determined by making a comparison between the total number of outstanding shares of a company during a certain period and the number of shares of that company that were traded during that period. This comparison takes place during the same period. When studying the capital market, trade volume activity is monitored to detect capital market responses via changes in trading volume (Mahendra & Rasmini, 2019). A shift in the amount of trading volume activity provides insight into the response of the market to an occurrence. It is generally accepted that a reaction from the market may be inferred from the existence of a discernible shift in the amount of trading activity before and after an occurrence by comparing the two time periods.

### **2.3 Previous Research**

Since the Russia-Ukraine Invasion is still a very recent topic so research on this event is still in progress. Therefore, it could be useful to first look at more general literature about previous political events like terrorist attack, trade war, global pandemic with event study method. The following are the findings from several earlier studies that have been conducted:

1. Kollias, Papadamou and Stagiannis (2011). This research investigates the effects of two terrorist attacks on the equities market: the bombs that occurred on March 11, 2004, in Madrid, and the bombings that occurred on July 7, 2005, in London. Using the event study approach for abnormal return and the GARCH family model for volatility.
2. Bash and Alsaifi (2019). This research analyzes whether uncertain events impact stock market results. To do a natural experiment, researchers evaluate the influence of the uncertain event of Jamal Khashoggi's disappearance on the Saudi Stock Exchange and researchers employ standard event-study approaches to assess the data.
3. Papakyriakou, Sakkas and Taoushianis (2019). The researchers examine events of terrorism that took place in G7 countries during the period of 1998–2017 and investigate the impact those crimes had on a selection of stock market indexes from 66 different nations. Researchers using a methodology

known as event study discover that stock markets experience a big drop on the day of the event as well as the trading day that follows.

4. Yasa and Sari (2020). This research examined whether the Wall Street Weakening event (the impact of the US-China trade war) had information content that caused the Indonesian capital market to react with abnormal returns and trading volume. 44 companies from the LQ 45 index were sampled using a non-probability, purposive sampling technique. Market-adjusted model calculates anomalous returns. Paired sample t-test and Wilcoxon signed rank test are utilized.
5. Saputra, et al. (2021). The purpose of this research is to determine whether or not there are any significant variations in the normal and abnormal average returns, as well as the trading volumes, of pharmaceutical companies before and after the first incidence of the coronavirus (COVID-19) was reported in Indonesia. This research used a methodology known as an event study and was conducted over the course of a period of fourteen14 days, beginning 7 days before and 7 days after the announcement of the first coronavirus case in Indonesia. In order to validate the hypothesis, a paired sample t-test was carried out.

**Table 1 Result of Previous Research**

| <b>Author(s)</b>                  | <b>Year</b> | <b>Research Title</b>                                                             | <b>Research Variable</b> | <b>Findings</b>                                                                                                                                |
|-----------------------------------|-------------|-----------------------------------------------------------------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Kollias, Papadamou and Stagiannis | 2011        | Terrorism and capital markets: The effects of the Madrid and London bomb attacks. | Abnormal Return          | Most sections of the Spanish market experienced significant negative abnormal returns, although this isn't the situation in the London market. |
| Bash and Alsaifi                  | 2019        | Fear From Uncertainty: An Event Study of Khashoggi and Stock Market Returns       | Abnormal Return          | According to the findings, the uncertain event had a significant and negative impact on the returns of Saudi stock markets.                    |



| Author(s)                            | Year | Research Title                                                                                                                     | Research Variable                                           | Findings                                                                                                                                                                                                                                                                                      |
|--------------------------------------|------|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Papakyriakou, Sakkas and Taoushianis | 2019 | The Impact of Terrorist Attacks in G7 Countries on International Stock Markets and The Role of Investor Sentiment                  | Abnormal Return                                             | It shows that the stock market experiences significant economic losses following a terrorist attack, with the impacts being felt more strongly on the day of the occurrence and the trading days that followed.                                                                               |
| Yasa and Sari                        | 2020 | Analysis of Market Reaction on Wall Street Attenuation in Indonesia                                                                | Abnormal Return, Trading Volume Activity                    | The Wall Street Weakening incident significantly increased abnormal returns and trade volume before and after the occurrence. The market reacted to Wall Street's weakness because of information content.                                                                                    |
| Saputra, et al.                      | 2021 | The Relationships between Abnormal Return, Trading Volume Activity and Trading Frequency Activity during the COVID-19 in Indonesia | Abnormal Return, Trading Volume Activity, Trading Frequency | Before and after the first COVID-19 was announced, there was no difference between the average abnormal return and trading volume activity of pharmaceutical stocks. However, there was a difference in the average trading frequency and average trading frequency of pharmaceutical stocks. |

## 2.4 Hypothesis Development

### 2.4.1 The Differences in Abnormal Return

While examining the impact of a particular event on the substance of information (Hartono, 2016), investors' investing choices will be influenced by the announcement's release of information. When a market receives news, it is anticipated that the market would respond, indicated by a change in the price of the underlying securities. The market's response to an announcement might lead to abnormal returns for investors, which can either lead to negative or positive reactions. If the information is positive, stock prices will climb as a result of the market's response. The stock price, on the other hand, will not alter or decline if the information delivers a negative message. An investor's response to new

information may be gauged by stock price movements and abnormal return (Hartono, 2016).

This argument is supported by research done by Yasa and Sari (2020) which examines the effect of the weakening of wall street as a result of the US-China trade war, Papakyriakou, et al (2019) which examines the influence of terrorist attacks in G7 countries, Bash and Alsaifi (2019) which examines the disappearance of a prominent journalist named Khashoggi, and Kollias, et al (2011) which examines the effects of terrorist attacks. The results of these studies explain the significant abnormal return before and after the event. This is contrary to the research results of Saputra, et al. (2021), who reported no significant change in the mean abnormal return before and after the event.

Based on the above description, the announcement of the Russia-Ukraine invasion as an event that allegedly contains information that could influence the market reaction. The market reaction is indicated by changes in the company's stock price as measured by abnormal returns. If abnormal returns are used, it can be said that an announcement that contains information will provide an abnormal return to the market. In contrast, an invasion announcement that does not contain information does not provide an abnormal return to the market. Hence, the following research hypothesis will be utilized:

H1 : There is significant differences in abnormal return before and after the announcement of the Russia-Ukraine Invasion in 7 countries.

H2 : There is significant differences in abnormal return before and after the announcement of the Russia-Ukraine Invasion in OPEC.

H3 : There is significant differences in abnormal return before and after the announcement of the Russia-Ukraine Invasion in Non-OPEC.

H4 : There is significant differences in abnormal return before and after the announcement of the Russia-Ukraine Invasion in semi-strong market efficient form.

H5 : There is significant differences in abnormal return before and after the announcement of the Russia-Ukraine Invasion in weak market efficient form.

H6 : There is significant differences in abnormal return before and after the announcement of the Russia-Ukraine Invasion in inefficient market form.

#### 2.4.2 *The Differences in Trading Volume Activity*

To gauge the overall condition of the market, trade volume data is important. In Nurhaeni (2009), trading volume activity is described as a tool for observing the capital market's response to new information. Investor behavior is reflected in the rise of trade volume, which, according to Liogu and Saerang (2015), is a measure of the intensity between supply and demand.

To determine whether an event is a positive or negative signal for stock trading choices, traders might look at trading volume activity. The trading volume will grow if investors perceive the positive signal from the information as an indication that the stock market is robust. The volume of stock trading will fall if the demand for shares falls below the supply, which is the opposite of what would happen if the information sends a negative message (Hutami & Ardiyanto, 2015). Research by Mahajan also Yasa and Sari (2020) indicated significant differences in the amount of trading volume activity before and after the event research, which supports the theory above. However, The trading volume activity before and after the event study did not alter significantly, according to Saputra, et al (2021).

Based on the above description, A shift in the amount of trading volume activity provides insight into the reaction of the market to an event. It is generally accepted that an indication that the market has reacted to an event is a detectable shift in the level of trading volume activity or a significant change in trading volume activity that occurs between the time period before and after the event. Hence, the following research hypothesis will be utilized:

H7 : There is significant differences in trading volume activity before and after the announcement of the Russia-Ukraine Invasion in 7 countries.

H8 : There is significant differences in trading volume activity before and after the announcement of the Russia-Ukraine Invasion in OPEC.

H9 : There is significant differences in trading volume activity before and after the announcement of the Russia-Ukraine Invasion in Non-OPEC.

H10 : There is significant differences in trading volume activity before and after the announcement of the Russia-Ukraine Invasion in semi-strong market efficient form.

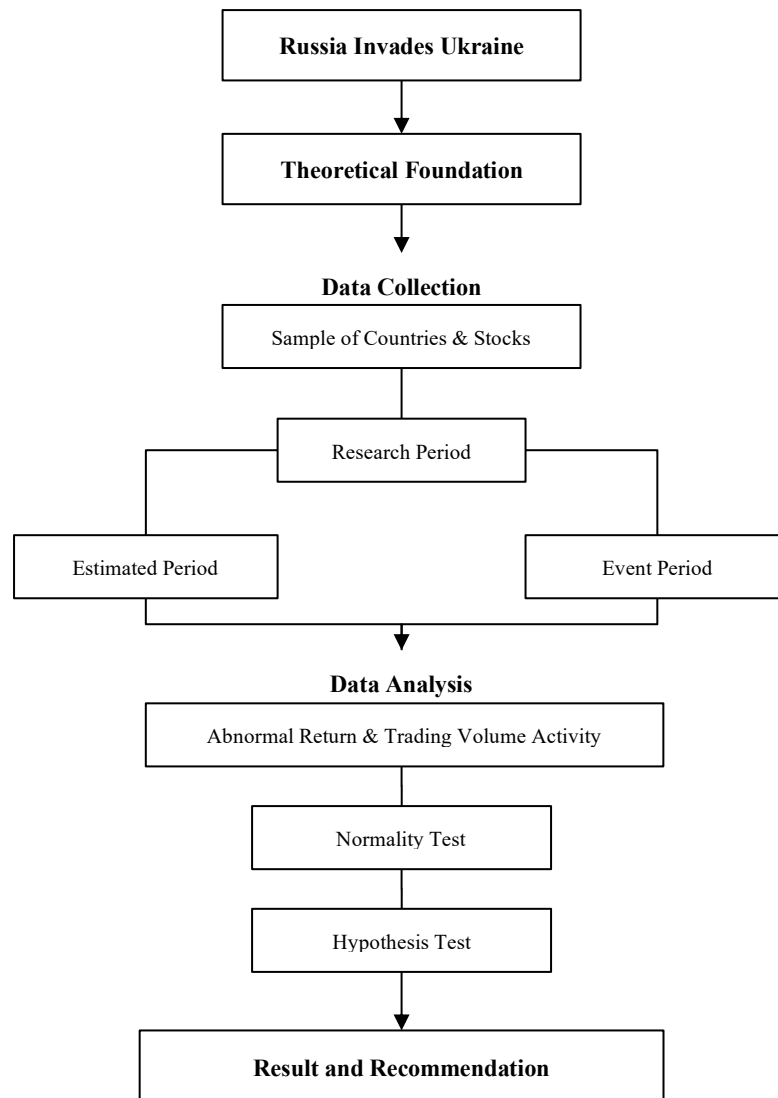
H11 : There is significant differences in trading volume activity before and after the announcement of the Russia-Ukraine Invasion in weak market efficient form.

H12 : There is significant differences in trading volume activity before and after the announcement of the Russia-Ukraine Invasion in inefficient market form.

## CHAPTER 3

### RESEARCH METHODOLOGY

This chapter describes the methodology used in this study. This research design outlined the processes for doing this study.



**Figure 3 Research Design**

The author will conduct an analysis of the impact Russia's invasion of Ukraine had on the stock market, especially in the oil and gas sector in order to determine whether or not there was a significant reaction from the market. In addition, the difference between abnormal returns and trading volume activity, both before and after the event will be studied. The analysis is going to be carried out using an event study. The reference literature for this research will originate from journals and the news media. Theories and related research were gathered from earlier

publications to aid the author in presenting theories in performing event investigations. Events can be examined using the news media as a source.

### 3.1 Data Collection

#### 3.1.1 Population and Sample

In this research, the populations are the stock of the company listed in each country's stock exchange as an observation. There are a total of 298 stocks in the population. The sample used in this research will be chosen with purposive sampling method which is limited into several criteria as following:

1. The observed countries have a total of 50% of global exports and also have oil and gas shares listed on the respective country's stock exchanges. Based on OEC.world, there are 10 biggest oil exporters in the world, namely Saudi Arabia, Russia, United States, Canada, Iraq, United Arab Emirates, Nigeria, Kuwait, Kazakhstan, and Norway. From these countries, Russia will be excluded from observation because during the research period the Russian stock exchange is closed. Then, Iraq was also excluded from research observations because there were no oil and gas stocks listed on its stock exchange ([www.isx-iq.net](http://www.isx-iq.net)). Lastly, Kazakhstan was also excluded from research observations due to limited access to data collection. Therefore, 7 countries were collected as observations in this study with a total of 50% of global exports with details from each country as follows:

**Table 2 List of Countries**

| No.   | Country                        | Export Globally |
|-------|--------------------------------|-----------------|
| 1.    | Saudi Arabia                   | 15%             |
| 2.    | United States of America (USA) | 8.2%            |
| 3.    | Canada                         | 7.4%            |
| 4.    | United Arab Emirates (UAE)     | 6.6%            |
| 5.    | Nigeria                        | 4.7%            |
| 6.    | Kuwait                         | 4.42%           |
| 7.    | Norway                         | 3.7%            |
| Total |                                | 50.02%          |

Then, the selected oil and gas stocks have > 50% market capitalization in the oil and gas sector in each country. There are a total of 298 oil and gas stocks from each country, with details as follows: Saudi Arabia has 5 registered oil and gas companies ([saudiexchange.sa](http://saudiexchange.sa)), USA has 115 oil and gas companies

and Canada has 149 oil and gas companies (companiesarketcap.com), UAE has 3 registered oil and gas companies (adx.ae), Nigeria has 11 registered oil and gas companies (african-markets.com), Kuwait has 6 registered oil and gas companies (boursakuwait.com), and Norway has 9 registered oil and gas companies (gulfoilandgas.com). So, to minimize the sample, the author decided to collect oil and gas stocks based on market capitalization with at least 50% total market capitalization in the oil and gas sector in each country. The following is the data of 29 stocks:

**Table 3 List of Stocks**

| No. | Stock Code | Company Name                                     | Country      |
|-----|------------|--------------------------------------------------|--------------|
| 1   | 2222.SR    | Saudi Arabian Oil Co.                            | Saudi Arabia |
| 2   | 2380.SR    | Rabigh Refining and Petrochemical Company        | Saudi Arabia |
| 3   | 4200.SR    | Aldrees Petroleum and Transport Services Company | Saudi Arabia |
| 4   | 2030.SR    | Saudi Arabia Refineries Company                  | Saudi Arabia |
| 5   | 4030.SR    | The National Shipping Company of Saudi Arabia    | Saudi Arabia |
| 6   | XOM        | Exxon Mobil                                      | USA          |
| 7   | CVX        | Chevron                                          | USA          |
| 8   | COP        | ConocoPhillips                                   | USA          |
| 9   | PXD        | PioneerNatural Resources                         | USA          |
| 10  | SLB        | Schlumberger Limited                             | USA          |
| 11  | OXY        | Occidental Petroleum Corporation                 | USA          |
| 12  | CVE.TO     | Cenovus Energy Inc.                              | Canada       |
| 13  | ENB.TO     | Enbridge Inc.                                    | Canada       |
| 14  | SU.TO      | Suncor Energy Inc.                               | Canada       |
| 15  | IMO.TO     | Imperial Oil Ltd.                                | Canada       |
| 16  | CNQ.TO     | Canadian Natural Resources Ltd.                  | Canada       |
| 17  | ADNOCDIST  | Abu Dhabi National Oil Company For Distribution  | UAE          |
| 18  | ADNOCDRILL | ADNOC Drilling Company PJSC                      | UAE          |
| 19  | DANA       | DANA GAS PSJC                                    | UAE          |
| 20  | SEPLAT.NL  | Seplat Energy Plc                                | Nigeria      |
| 21  | TOTAL.NL   | Total Energies Marketing Nigeria                 | Nigeria      |

| No. | Stock Code | Company Name                                                             | Country |
|-----|------------|--------------------------------------------------------------------------|---------|
| 22  | CONOIL     | Conoil Plc                                                               | Nigeria |
| 23  | SENERGY.KW | Senergy Holding Company K.S.C.W                                          | Kuwait  |
| 24  | IPG.KW     | Independent Petroleum Group K.S.C.P                                      | Kuwait  |
| 25  | NAPESCO.KW | National Petroleum Services Company K.S.C.P                              | Kuwait  |
| 26  | GPI.KW     | Gulf Petroleum Investment Company K.P.S.C                                | Kuwait  |
| 27  | ABAR.KW    | Burgan Company For Well Drilling, Trading and Maintenance K.S.C (Public) | Kuwait  |
| 28  | EQNR.OL    | Equinor ASA                                                              | Norway  |
| 29  | VAR        | VAR Energy                                                               | Norway  |

In addition, from 7 countries with a total of 29 companies in the oil and gas sector, the author decided to do a sub-sampling consisting of 2 categories to see if there were differences in results after 7 countries as overall data were reanalyzed based on the 2 categories.

The first categories, based on countries who are members of OPEC and not members of OPEC. Because this study analyzes events in the oil and gas sector, the Organization of the Petroleum Exporting Countries (OPEC) is an organization that has an important role in the oil and gas industry, where this industry also has an important role in the global economy. By 2022, it is estimated that world revenues generated by the oil and gas business will amount to approximately \$5 trillion (www.ibisworld.com, 2022). This made oil and gas one of the most valuable industries in the world and because of this an organization called The Organization of the Petroleum Exporting Countries was formed, which aims to create a strategy in an effort to maintain and increase the role of petroleum as the main energy source in improving the global economy in a sustainable manner. Therefore, it is important to do a sub-sampling study based on OPEC and Non-OPEC. In this research, the OPEC and Non-OPEC member countries are as follows:

**Table 4 List of Countries of OPEC and Non OPEC**

| Category | Country              |
|----------|----------------------|
| OPEC     | Saudi Arabia         |
|          | United Arab Emirates |
|          | Nigeria              |
|          | Kuwait               |



| Category | Country                  |
|----------|--------------------------|
| Non OPEC | United States of America |
|          | Canada                   |
|          | Norway                   |

Second, the analysis based on countries with efficient market forms carries the Efficient Market Hypothesis (EMH) theory, in addition to seeing whether the results of market reactions show the same results when countries are separated based on their efficient market forms and also to see how the observed countries react to events based on efficiency level. In this study, it is divided into three categories as follows:

**Table 5 List of Countries based on Efficient Market Form**

| Category    | Country                  | Reference                   |
|-------------|--------------------------|-----------------------------|
| Semi-Strong | United States of America | (Seyhun, 1986)              |
| Weak        | Saudi Arabia             | (Asiri & Alzeera, 2013)     |
|             | Canada                   | (Alexeev & Tapon, 2011)     |
|             | United Arab Emirates     | (Moustafa, 2004)            |
|             | Nigeria                  | (Ajao & Osayuwu, 2012)      |
|             | Norway                   | (Sabbaghi & Sabbaghi, 2018) |
|             | Kuwait                   | (de Villiers, 2000)         |

### 3.1.2 Type and Source of Data

The research will conduct use of secondary data, which contains the following types of data:

1. The information on the occurrence of Russia's invasion of Ukraine is collected and obtained from the mass media.
2. Data collection for countries as the largest exporters of oil and gas is obtained from data statistics that get in the websites. (oec.world and [statista.com](https://www.statista.com)).
3. The closing price of the listed stocks during the events window. The data is collected from yahoo finance, bloomberg, and each country's stock exchange official websites.
4. Daily stock trading volume of the stocks that are listed during the events window. The data is collected from yahoo finance, bloomberg, and each country's stock exchange official websites.
5. Number of Outstanding Share of the stocks that are listed during the events window. The data is collected from bloomberg.

6. TASI Index. This data is collected from the Saudi Arabia stock exchange official website. ([www.saudiexchange.sa](http://www.saudiexchange.sa))
7. NYSE Index. This data is collected from yahoo finance which is used for the calculation of shares from the country of the United States of America.
8. S&P/TSX Composite Index. This data is collected from yahoo finance which is used for the calculation of shares from the country of Canada.
9. FTSE ADX General Index. This data is collected from bloomberg which is used for the calculation of shares from the country of United Emirate Arab.
10. NGX All Share Index. This data is collected from Nigeria stock exchange official website. ([www.african-markets.com](http://www.african-markets.com)).
11. Kuwait Index. This data is collected from Kuwait Stock Exchange official website. ([www.boursakuwait.com](http://www.boursakuwait.com)).
12. Oslo Bors All Share Index. This data is collected from yahoo finance which is used for the calculation of shares from the country of Norway.

### **3.2 Event Study**

In making observations, this research uses the event study method. Researchers use event-study methods to gauge the effects of information arrival on stock prices (Campbell, et al., 2010). Event Study is a special observation using financial market data in measuring the relationship to a firm's value at a specific time (MacKinlay, 1997). The goal behind an event study is to perform a comparison between the returns that would have been generated normally if the event being examined had not occurred and the returns that would have been generated as a direct consequence of the events studied (abnormal returns). In addition, the classical event study method used by Fama in 1969 to measure the effect of stock splits on security prices. The conclusion of the study supports the efficient market hypothesis because irregular abnormal results were found during the study period.

There are also three different types of information that relates to prices. As a result, the three distinct forms of event studies might each have their own characteristics. The first kind of information that is important to prices is provided by corporate events. Company events include, but are not limited to, the announcement of asset sales, changes in capital structure, untimely deaths of CEOs, bankruptcies, corporate name changes, dividend adjustments, credit rating

changes, earnings warnings, and mergers and acquisitions (M&A). This category of events has the potential to affect not just the stock prices of the companies that announce them, but also the stock prices of the companies that are the rivals, customers, and suppliers of the companies that made the announcement. The second kind of information that may affect prices is an announcement of a significant economic event, an announcement made by a central bank, or news that relates to significant commodities like gold and oil. The third kind of pertinent information is occurrences from the regulatory sector. The examples include the new regulations that will result in higher salaries for those working for the government.

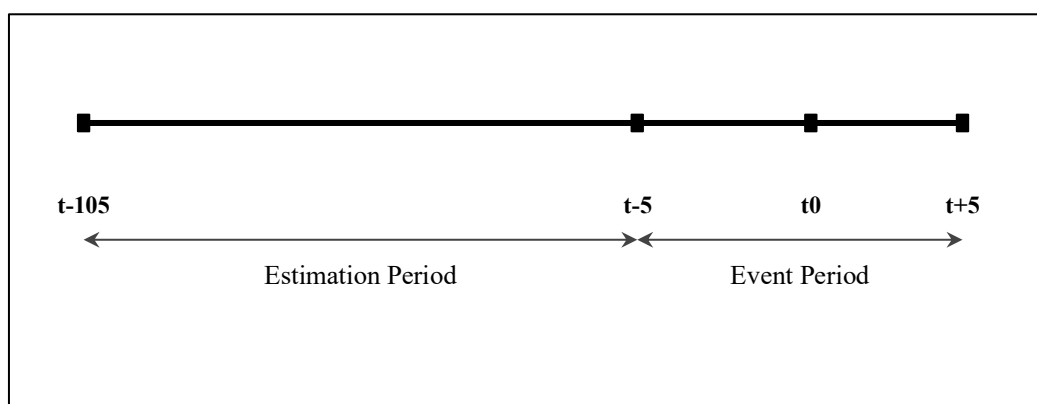
There are three assumptions that form the foundation of the event study. The first, market efficiency which defined as a capital market whose share price represents all essential information (Bodie, et al., 2005:371). The capital market will be more efficient the faster fresh information is reflected into stock prices. Therefore, in an efficient capital market, the possibility for investors to earn above-normal returns (abnormal returns) is very small.

Second, unanticipated event as another basic assumption that the event to be examined for its impact on stock returns must be an unanticipated occurrence and mass media is the only source of information, as distinct to alternative information sources. If the event was predicted in advance or public information of the event existed prior to its official announcement, then the current stock price reflects this information. While the purpose of an event study is to determine the impact of an event on the return of a stock by measuring whether there is an abnormal return on the stock.

Then third, confounding effects are assumed that there are no other events that can disrupt the impact of the event being studied. The effect of the mixing of an event with other events in the period under study causes the measurement of market reaction to be inaccurate. Isolating other events that affect a particular event is indeed quite difficult, but it is necessary to establish the assumption that the disruptive effects have been isolated to facilitate the implementation of the research, which means that the factors that affect the company's stock price in the research period are solely influenced by the event being studied.

According to MacKinlay (1997), there is not one particular measurement that can be used for determining the event window. The event window is an observation period that varies in length or period. The time frame for the event is established according to the requirements of the study. In actuality, the time period that has to be examined often involves a few days both before and after the announcement. At the very least, it takes into account the day of the announcement as well as the day following the announcement. As a result, it is possible for it to reflect the influence of the object that is being studied. However, the longer the event window is used, the harder it will be to ensure that there are no other events that will disrupt the impact of the event under study. Typically, the duration of the window utilized for daily data ranges from 3 to 121 days. Meanwhile, the usual estimate period for daily data spans from 100 to 300 days.

Therefore, the author would like to establish -105 to -6 trading days as the estimate period for the market model parameters used to predict expected return. The event period is then classified as -5 to +5 trade days. As reported by CNBC on Thursday, February 24, 2022, Russia began an unprecedented invasion of its neighbor Ukraine in the early hours of the day (Ellyatt, 2022). So,  $t_0$  or event day will be February 24. The study time is then split into two sections: the estimate period and the window period. Event window dates are only included when the market opens. Date and time when the market is closed, such as holidays and weekends, are eliminated and replaced with the next market day.



**Figure 4 Research Period**

### 3.3 Data Analysis

The analysis of the data will be conducted quantitatively with an event studies framework. The data that has been collected and has been processed into abnormal

returns and trading volume activity will be processed through two stages, normality test and statistical hypothesis testing.

### 3.3.1 Calculating Abnormal Return

The abnormal return can be calculated by:

$$AR_{i,t} = R_{i,t} - E(R_{i,t})$$

**Equation 1**

Where,

$AR_{i,t}$  = Abnormal return of stock i in the period t

$R_{i,t}$  = Actual return of stock i in the period t

$E(R_{i,t})$  = Expected return of stock i in the period t

Then, the actual return and coincidence in this study using daily data can be obtained using the following formula:

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

**Equation 2**

Where,

$R_{i,t}$  = Actual return of stock i in the period t

$P_{i,t}$  = The price of stock i in the period t

$P_{i,t-1}$  = The price of stock i in the period t-1

To find the Expected return that is needed also in finding abnormal returns, the author uses a market model which can be calculated by:

$$E(R_{i,t}) = \alpha_i + \beta_i(Rm_{i,t}) + \varepsilon_{i,t}$$

**Equation 3**

Where,

$E(R_{i,t})$  = Expected return of stock i in the period t

$\alpha_i$  = Intercept for stock i

$\beta_i$  = Slope coefficient which is a beta of stock i

$(Rm_{i,t})$  = Market return of stock i in the period t

The author will use the abnormal return analysis approach in order to provide a response to research question. Because the abnormal return had already been computed, the analysis can be extended into computing the average abnormal return before and after the event.

$$AAR_i \text{ before} = \frac{\sum_{j=-5}^{t=-1} AR_{i,j} \text{ before}}{N}$$

**Equation 4**

$$AAR_i \text{ after} = \frac{\sum_{j=+1}^{t=+5} AR_{i,j} \text{ after}}{N}$$

**Equation 5**

Where,

$AAR_i$  = Average Abnormal Return of all shares

$AR_{i,j}$  = Abnormal return stock for event j

$N$  = The number of samples

Since, this study calculates the Abnormal Return of various stocks, so it is necessary to calculate the Average Abnormal Return of the entire sample stocks. So, for the next author will refer to as Average Abnormal Return (AAR) in the results section.

### 3.3.2 Calculating Trading Volume Activity

It is necessary to utilize the trading volume activity to demonstrate the trading activity of the stocks and to represent the ways in which the stocks are traded on the market. The following is one possible formulation for the trading volume activity: (Charles P, 1986).

$$TVA_{i,t} = \frac{\sum \text{Shares } i \text{ traded at period } t}{\sum \text{Outstanding shares available at period } t}$$

**Equation 6**

The author will use the abnormal return analysis approach in order to provide a response to research question. Because the trading volume activity had already been computed, the analysis can be extended into computing the average trading volume activity before and after the event.

$$ATVA_i \text{ before} = \frac{\sum_{j=-5}^{t=-1} TVA_{i,j} \text{ before}}{N}$$

**Equation 7**

$$ATVA_i \text{ after} = \frac{\sum_{j=-1}^{t=+5} TVA_{i,j} \text{ after}}{N}$$

**Equation 8**

Where,

$ATVA_i$  = Average Trading Volume Activity of all shares

$TVA_{i,j}$  = Trading Volume Activity stock for event j

$N$  = The number of samples

Same as like Abnormal Return, since this study calculates the Trading Volume Activity of various stocks, so it is necessary to calculate the Average Trading Volume Activity of the entire sample stocks. So, for the next author will refer to as Average Trading Volume Activity (ATVA) in the results section.

### 3.3.3 Conducting Statistical Test

#### 3.3.3.1 Normality Test

The purpose of the normality test is to establish the appropriate statistical techniques for this study and to assess whether or not the data has a normal distribution. If the data have a normal distribution, parametric statistics should be used. If, on the other hand, the data are not normally distributed, nonparametric statistics is the suitable method (Kim, 2015). Kolmogorov-Smirnov test Shapiro-Wilk (SW) test, Lilliefors (LF) test, and Anderson Darling (AD) test are a few examples of basic normality tests.

However, for this study, the Shapiro-Wilk test would be used since it is the most reliable normality test available, and because it is more appropriate for small to medium sample sizes (Razali & Wah, 2011). Using two-tailed tests, Shapiro-Wilk compares the standard normal distribution with the distribution of research data (p-value). This test use a significance level (alpha) of 0.05 %. If the p-value is greater than the significance level, the data is normally distributed, and vice versa.

#### 3.3.3.2 Statistical Hypothesis Testing

The hypothesis proposed in this study is whether there are significant differences before and after the event, as measured by abnormal returns and trading volume activity on oil and gas stocks listed in 7 countries.

In order to produce an accurate assessment of the significant difference that existed between before and after the announcement of the Russia-Ukraine invasion, it is necessary to put the developed hypotheses to the test.

This test is comprised of two distinct types of statistical examinations, the first of which is a parametric statistical test, also known as a Paired T-test. The goal of this analysis is to evaluate whether or not there is a statistically significant difference between the two variables before and after the announcement of the invasion. Specifically, the time period in question is before and after the formal announcement of the invasion. The paired T-test, which has a significance level of 5% will be used in the case that the data reflect a normal distribution. Carry out the tests in order to get results that are in accordance with the following criteria:

1. If the p-value is greater than 0.05, then  $H_0$  will be accepted.
  - In abnormal return data,  $H_0$  = There is no significant differences in abnormal return between before and after the announcement of Russia-Ukraine invasion.
  - In trading volume activity data,  $H_0$  = There is no significant differences in trading volume activity between before and after the announcement of Russia-Ukraine invasion.
2. If the p-value is lower than 0.05, then  $H_0$  will be rejected. Then, alternative hypothesis will be used which is the research hypothesis.

The second kind of statistical analysis is known as a non-parametric test, and it is used in situations in which the data being analyzed are not normally distributed. The Wilcoxon Signed Rank Test is the non-parametric statistical test that used in this study to test the significant difference between the two variables before and after the announcement of the invasion. This test was used to determine whether or not there was a difference between the two variables before and after the invasion was announced. The Wilcoxon Signed Rank test is used to compare two correlated samples or repeated measurements of a single sample to evaluate whether or not the population as a whole has a different rank. This may be done in order to identify whether or not there is a difference between the samples.



## CHAPTER 4

### DATA ANALYSIS

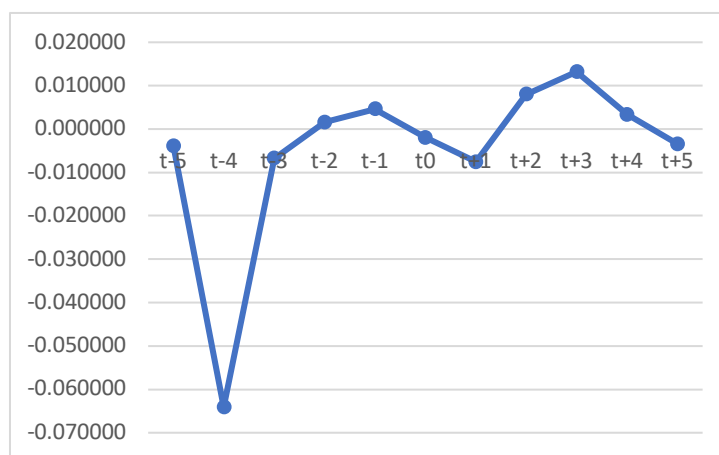
#### 4.1 Descriptive Statistic

##### 4.1.1 Descriptive Statistic for Abnormal Return of 7 Countries

**Table 6 Average Abnormal Return Before and After Invasion of 7 Countries**

|      | Before Invasion | After Invasion |
|------|-----------------|----------------|
| N    | 29              | 29             |
| Min  | -0.2894720      | -0.0207950     |
| Mean | -0.0137108      | 0.0027040      |
| Max  | 0.0155710       | 0.369830       |

The result of the mean AAR before the invasion is -0.0137108, and the result of the mean AAR after the invasion is 0.0027040. This has a good response from investors since the mean increased by 0.0164148. This market response may be substantiated by the data that is displayed in Figure 5 which shows the daily AAR during the research period.



**Figure 5 Average Abnormal Return Daily of 7 Countries**

##### 4.1.2 Descriptive Statistic for Average Abnormal Return of OPEC – Non OPEC

**Table 7 Average Abnormal Return Before and After Invasion of OPEC-Non OPEC**

|      | OPEC            |                | Non OPEC        |                |
|------|-----------------|----------------|-----------------|----------------|
|      | Before Invasion | After Invasion | Before Invasion | After Invasion |
| N    | 16              | 16             | 13              | 13             |
| Min  | -0.2894720      | -0.0207950     | -0.0008930      | -0.0097930     |
| Mean | -0.0285356      | -0.0002512     | 0.0045352       | 0.0063411      |
| Max  | 0.0155710       | -0.0369830     | 0.0111270       | 0.0332180      |

In the OPEC category, the mean of AAR before the invasion is -0.0285356 and the mean of AAR after the invasion is -0.0002512, this has a positive reaction from investors and even the increase is higher than in the 7 countries because the

mean in the OPEC increased by about 0.0282844 after the invasion. Then, in the Non-OPEC category there is also a positive reaction from investors because the mean increase by 0.0018059 from 0.0045352 to 0.0063411, but compared to the 7 countries data this number is below than in 7 countries. This market reaction can be supported based on the data shown in Figure 6 which displays the daily AAR on OPEC and Non-OPEC during the study period.

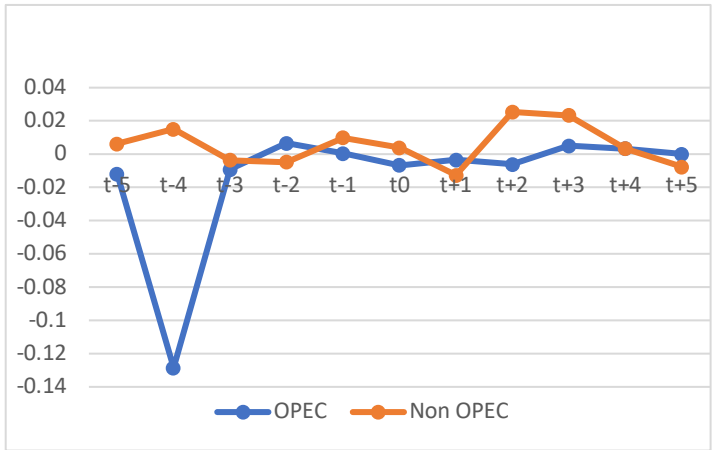


Figure 6 Average Abnormal Return Daily of OPEC and Non OPEC

#### 4.1.3 Descriptive Statistic for Average Abnormal Return of EMH Categories

Table 8 Average Abnormal Return Before and After Invasion of EMH Categories

|      | Semi-Strong Form |                | Weak Form       |                | Inefficient     |                |
|------|------------------|----------------|-----------------|----------------|-----------------|----------------|
|      | Before Invasion  | After Invasion | Before Invasion | After Invasion | Before Invasion | After Invasion |
| N    | 6                | 6              | 18              | 18             | 5               | 5              |
| Min  | 0.0013000        | -0.0068000     | -0.2895000      | -0.0098000     | -0.0125000      | -0.0208000     |
| Mean | 0.0052167        | 0.0131000      | -0.0212889      | 0.0045167      | -0.0091400      | -0.0163000     |
| Max  | 0.0111000        | 0.0332000      | 0.0156000       | 0.0370000      | 0.0028000       | -0.0007000     |

In the Semi-Strong Form category, the mean of AAR before the invasion is -0.0052167 and the mean of AAR after the invasion is 0.0131000, this is a positive reaction from investors because the mean increased by about 0.0078833 after the invasion. But this number slightly lower than the increased number in 7 countries. Then, in the Weak Form category there is also a positive reaction from investors because the mean increased by 0.0258056 from -0.0212889 to 0.0045167 which is the increased was higher than in 7 countries. However, different from the semi strong and weak results, the inefficient market category shows a negative reaction because the average yield fell from -0.0091400 to -0.0163000. This market reaction can be supported based on the data shown in Figure 7 which shows daily AAR on Semi-strong form, Weak form, and Inefficient during the research period.

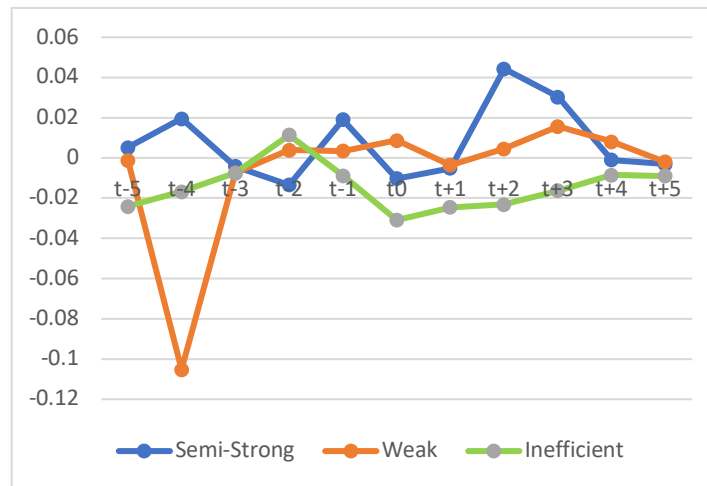


Figure 7 Average Abnormal Return Daily of EMH Categories

#### 4.1.4 Descriptive Statistic for Average Trading Volume Activity of 7 Countries

Table 9 Average Trading Volume Activity Before and After Invasion of 7 Countries

|      | Before Invasion | After Invasion |
|------|-----------------|----------------|
| N    | 29              | 29             |
| Min  | 0               | 0              |
| Mean | 0.0044621       | 0.0068034      |
| Max  | 0.0179000       | 0.0520000      |

The result of the mean of ATVA before the invasion is 0.0044621 and the mean of ATVA after the invasion is 0.0068034, this is a positive reaction from investors because the mean increases by 0.0023413 after the invasion. This market reaction can be supported based on the data shown in Figure 8 which shows the daily ATVA during the study period and it shows after the invasion tends to increase compared to before the invasion.

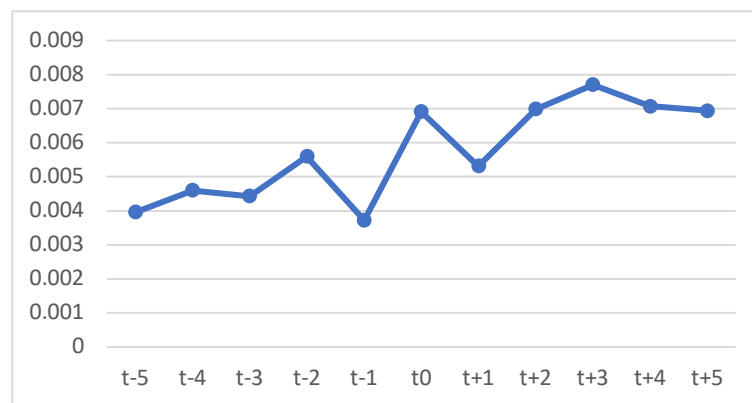


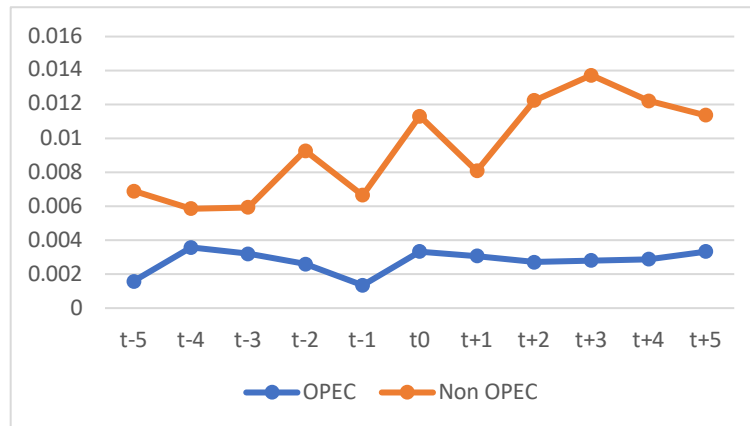
Figure 8 Average Trading Volume Activity Daily of 7 Countries

#### 4.1.5 Descriptive Statistic for Average Trading Volume Activity of OPEC – Non OPEC

**Table 10** Average Trading Volume Activity Before and After Invasion of OPEC - Non OPEC

|          | OPEC            |                | Non OPEC        |                |
|----------|-----------------|----------------|-----------------|----------------|
|          | Before Invasion | After Invasion | Before Invasion | After Invasion |
| N        | 16              | 16             | 13              | 13             |
| Min      | 0               | 0              | 0.0014000       | 0.0025000      |
| Mean     | 0.0024688       | 0.0029625      | 0.0069154       | 0.0115308      |
| Max      | 0.0109000       | 0.0167000      | 0.0179000       | 0.0520000      |
| Std. Dev | 0.0032440       | 0.0041585      | 0.0048409       | 0.0128397      |

In the OPEC category, the mean ATVA before the invasion is 0.0024688 and the mean of ATVA after the invasion is 0.0029625, this is a positive reaction from investors because the mean increased by 0.0004937 after the invasion but compared to the result in 7 countries, this number is below from the results of 7 countries which increased by 0.0023413. Then, in the Non-OPEC category there was also a positive reaction from investors because the mean increased by 0.0046154 from 0.0069154 to 0.0115308 after the invasion which the increased is higher than in 7 countries result. This market reaction can be supported based on the data shown in Figure 9 which displays the daily ATVA on OPEC and Non-OPEC during the study period.



**Figure 9** Average Trading Volume Activity of OPEC - Non OPEC

#### 4.1.6 Descriptive Statistic for Average Trading Volume Activity of EMH Categories

**Table 11** Average Trading Volume Activity Before and After Invasion of EMH Categories

|      | Semi-Strong Form |                | Weak Form       |                | Inefficient     |                |
|------|------------------|----------------|-----------------|----------------|-----------------|----------------|
|      | Before Invasion  | After Invasion | Before Invasion | After Invasion | Before Invasion | After Invasion |
| N    | 6                | 6              | 18              | 18             | 5               | 5              |
| Min  | 0.0057000        | 0.0083000      | 0               | 0.0001000      | 0               | 0              |
| Mean | 0.0100167        | 0.0183500      | 0.0028222       | 0.0043556      | 0.0037000       | 0.0017600      |
| Max  | 0.0179000        | 0.0520000      | 0.0109000       | 0.0167000      | 0.0109000       | 0.0031000      |

In the Semi-Strong Form category, the mean of ATVA before the invasion is 0.0100167 and the mean of ATVA after the invasion is 0.0183500, this is a positive reaction from investors because the mean increased by about 0.0088333 after the invasion. Then, in the Weak Form category there was also a positive reaction from investors because the mean increased by 0.0138778 from 0.0028222 to 0.0167000. However, the Inefficient market category showed a negative reaction because the mean result fell from 0.0037000 to 0.0017600 after the invasion. This market reaction can be supported based on the data shown in Figure 10 which displays the daily ATVA on the Semi-strong form, Weak form, and Inefficient during the research period.

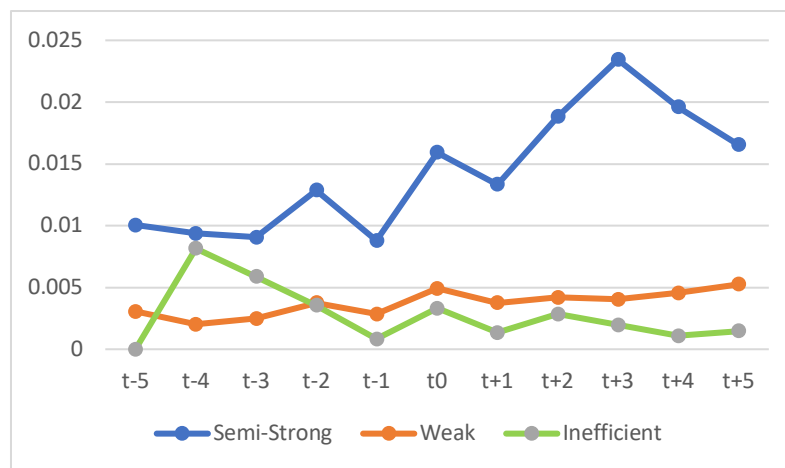


Figure 10 Average Trading Volume Activity Daily of EMH Categories

## 4.2 Abnormal Return

### 4.2.1 Normality Test

This table shows the p-value of the Shapiro-Wilk Test, which was calculated using SPSS 26. The test results are differentiated based on the following categories:

### 7 Countries as Overall Result

Table 12 Normality Test for AAR of 7 Countries

|                                | Statistic | df | Sig.  |
|--------------------------------|-----------|----|-------|
| Average Abnormal Return Before | 0.379     | 29 | 0.000 |
| Average Abnormal Return After  | 0.946     | 29 | 0.143 |

According to Table 12, the average abnormal return (AAR) before invasion resulted in a p-value (sig.) which is 0.000, this indicates that the data are not normally distributed because the p-value is less than 0.05. The AAR after invasion resulted in a p-value of 0.143, which means  $p\text{-value} > 0.05$  and indicates that the

data are normally distributed. The Wilcoxon Signed Rank Test will be used since one of the data sets is not normally distributed.

### OPEC – Non OPEC Categories as 1<sup>st</sup> Sub-Sampling

**Table 13 Normality Test for AAR of OPEC - Non OPEC**

|          |                                | Statistic | df | Sig.  |
|----------|--------------------------------|-----------|----|-------|
| OPEC     | Average Abnormal Return Before | 0.482     | 16 | 0.000 |
|          | Average Abnormal Return After  | 0.907     | 16 | 0.106 |
| Non OPEC | Average Abnormal Return Before | 0.971     | 13 | 0.904 |
|          | Average Abnormal Return After  | 0.928     | 13 | 0.319 |

According to Table 13 in the OPEC category, the AAR before invasion had a p-value of 0.000, which indicates that the data are not normally distributed because  $p\text{-value} < 0.05$ ; however, the AAR after invasion had a p-value of 0.106, which indicates that the data are normally distributed because  $p\text{-value} > 0.05$ . Author will utilize Wilcoxon Signed Rank Test in order to assess data from both OPEC categories since one data item is not normally distributed. As can be observed, in the Non-OPEC group, the AAR values before invasion and after invasion are p-values of 0.904 and 0.319 which are  $p\text{-values} > 0.05$ . This indicates that the data are normally distributed, hence the Paired Sample T-Test will be used to assess both sets of data.

### EMH Categories as 2<sup>nd</sup> Sub-Sampling

**Table 14 Normality Test for AAR of EMH Categories**

|             |                                | Statistic | df | Sig.  |
|-------------|--------------------------------|-----------|----|-------|
| Semi-strong | Average Abnormal Return Before | 0.930     | 6  | 0.580 |
|             | Average Abnormal Return After  | 0.973     | 6  | 0.914 |
| Weak        | Average Abnormal Return Before | 0.441     | 18 | 0.000 |
|             | Average Abnormal Return After  | 0.856     | 18 | 0.010 |
| Inefficient | Average Abnormal Return Before | 0.580     | 5  | 0.000 |
|             | Average Abnormal Return After  | 0.586     | 5  | 0.000 |

It can be shown from Table 14 that the AAR before invasion of Semi-strong category had a p-value of 0.580, while the AAR after invasion had a p-value of 0.914. Paired Sample T-Test will be used to assess these two sets of data since the p-values for both sets of data are more than 0.05. Then in the Weak category, the p-value is 0.000 before invasion, and 0.010 after. The Wilcoxon Signed Rank Test will be used to assess these two sets of data since the p-values for both data are

less than 0.05. In the Inefficient category, it can be shown that AAR before invasion and AAR after invasion both had p-values of 0.000. P-values less than 0.05 indicate that the data is not normally distributed, hence the Wilcoxon Signed Rank Test will be used to evaluate both datasets.

#### 4.2.2 Statistical Hypothesis Test

### 7 Countries as Overall Result

**Table 15 Statistical Hypothesis Test for AAR of 7 Countries**

| Test Statistics <sup>a</sup> |                        |
|------------------------------|------------------------|
|                              | AAR Before – AAR After |
| Z                            | -.919 <sup>b</sup>     |
| Asymp. Sig. (2-tailed)       | 0.358                  |

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks

Wilcoxon Signed Rank Test findings are shown in Table 15, and the p-value (represented by Asymp Sig. 2-tailed) reveals a value of 0.358, which indicates that the two data sets are statistically insignificant because p-value > 0.05. It is thus acknowledged that the null hypothesis H<sub>0</sub> is accepted, indicating that there is no significant difference in the average abnormal return that happened before and after invasion.

### OPEC – Non OPEC as 1<sup>st</sup> Sub-Sampling

**Table 16 Statistical Hypothesis Test for AAR of OPEC**

| Test Statistics <sup>a</sup> |                        |
|------------------------------|------------------------|
|                              | AAR Before – AAR After |
| Z                            | -.828 <sup>b</sup>     |
| Asymp. Sig. (2-tailed)       | 0.408                  |

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks

It can be observed in Table 16 that the p-value of the AAR before-after of OPEC data shows a value of 0.408, which indicates that p-value > 0.05. Therefore, the null hypothesis H<sub>0</sub> is accepted, which indicates that there is not a significant difference between the average abnormal return that occurred before the invasion and the average abnormal return that occurred after the invasion.

**Table 17 Statistical Hypothesis Test for AAR of Non OPEC**

| <b>Paired Samples Test</b>    |        |    |                 |
|-------------------------------|--------|----|-----------------|
|                               | t      | df | Sig. (2-tailed) |
| <b>AAR Before – AAR After</b> | -0.511 | 12 | 0.618           |

It can be observed in Table 17 that shows the results of the Paired Sample T-Test on the average abnormal return before and after invasion in the non OPEC category. From the results of the table, it can be seen that the t count of -0.511 is still in the range of 2.179 (based on t-table), so this shows that H0 is accepted.

In addition, there are other indicators that can strengthen the results of this study, where the p-value (shown by Sig 2-tailed) is 0.618 which is the p-value > 0.05. This indicates that H0 is accepted, meaning that there is no significant difference between the average abnormal return before the invasion and the average abnormal return after the invasion.

### **EMH Categories as 2<sup>nd</sup> Sub-Sampling**

**Table 18 Statistical Hypothesis Test for AAR of Semi-Strong**

| <b>Paired Samples Test</b>    |        |    |                 |
|-------------------------------|--------|----|-----------------|
|                               | t      | df | Sig. (2-tailed) |
| <b>AAR Before – AAR After</b> | -1.266 | 5  | 0.261           |

It can be observed in Table 18, the results of the Paired Samples T-Test for the Semi-Strong category demonstrate that there is no significant difference between the average abnormal return before and after the invasion. According to the table that t count is -1.266 and this number is still within the acceptable range of 2.571 (based on t-table), which means that the hypothesis H0 is accepted.

In addition, there are additional indications that may enhance the findings of this research, where the p-value (shown by Sig. 2-tailed) is 0.261 and this means p-value > 0.05 so it indicates that H0 is accepted, which that there is no significant difference between the average abnormal return before the invasion and the average abnormal return after the invasion.



**Table 19 Statistical Hypothesis Test for AAR of Weak****Test Statistics<sup>a</sup>**

|                        | AAR Before – AAR After |
|------------------------|------------------------|
| Z                      | -1.491 <sup>b</sup>    |
| Asymp. Sig. (2-tailed) | 0.136                  |

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks

Table 19 shows that the two data (before and after) have a p-value of 0.136, which means  $p\text{-value} > 0.05$ . So based on this result,  $H_0$  is accepted, which means that there is no significant difference in the Weak Form Countries category between average abnormal returns before and after an invasion.

**Table 20 Statistical Hypothesis Test for AAR of Inefficient****Test Statistics<sup>a</sup>**

|                        | AAR Before – AAR After |
|------------------------|------------------------|
| Z                      | -2.060 <sup>b</sup>    |
| Asymp. Sig. (2-tailed) | 0.039                  |

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks

It can be observed in Table 20 that the p-value of the two data sets (before-after) is 0.039, which indicates that the p-value of the Weak form data is less than 0.05. This means that  $H_0$  is accepted, which means that the average abnormal return before an invasion and the average abnormal return after an invasion are significantly different in the Inefficient form.

### 4.3 Trading Volume Activity

#### 4.3.1 Normality Test

Based on the SPSS 26 test results, the Shapiro-Wilk test p-value (shown by Sig.) is provided in the following table. The test results are differentiated based on the following categories:

## 7 Countries as Overall Result

**Table 21 Normality Test for ATVA of 7 Countries**

|                                        | Statistic | df | Sig.  |
|----------------------------------------|-----------|----|-------|
| Average Trading Volume Activity Before | 0.853     | 29 | 0.001 |
| Average Trading Volume Activity After  | 0.604     | 29 | 0.000 |

It can be observed from Table 21 that the p-value of the ATVA before invasion was 0.001 and the p-value of the ATVA after invasion was 0.000. Because the p-value for both sets of data is less than 0.05, which indicates that the data does not normally distributed, the Wilcoxon Signed Rank Test will be used to assess both sets of data.

### OPEC – Non OPEC as 1<sup>st</sup> Sub-Sampling

**Table 22 Normality Test for ATVA of OPEC - Non OPEC**

|          |                                        | Statistic | df | Sig.  |
|----------|----------------------------------------|-----------|----|-------|
| OPEC     | Average Trading Volume Activity Before | 0.736     | 16 | 0.000 |
|          | Average Trading Volume Activity After  | 0.687     | 16 | 0.000 |
| Non OPEC | Average Trading Volume Activity Before | 0.898     | 13 | 0.127 |
|          | Average Trading Volume Activity After  | 0.611     | 13 | 0.000 |

Table 22 in the OPEC category shows that the ATVA before the invasion had a p-value of 0.000, and the ATVA after the invasion had a p-value of 0.000. The both set of data will be investigated using the Wilcoxon Signed Rank Test since both sets of data have p-values that are less than 0.05, which indicates that the data do not normally distributed. Then, in the Non-OPEC category, it can be seen that the ATVA before the invasion had a p-value of 0.127 indicating that the p-value  $> 0.05$  which means the data is normally distributed, while the ATVA after the invasion resulted in a p-value of 0.000 indicating that the p-value  $< 0.05$  which means that the data is not normally distributed. Since, one of the datasets is not normally distributed, The Wilcoxon Signed Rank Test will be used to evaluate the two datasets.

### EMH Categories as 2<sup>nd</sup> Sub-Sampling

**Table 23 Normality Test for ATVA of EMH Categories**

|             |                                        | Statistic | df | Sig.  |
|-------------|----------------------------------------|-----------|----|-------|
| Semi-strong | Average Trading Volume Activity Before | 0.886     | 6  | 0.300 |
|             | Average Trading Volume Activity After  | 0.622     | 6  | 0.001 |
| Weak        | Average Trading Volume Activity Before | 0.794     | 18 | 0.001 |
|             | Average Trading Volume Activity After  | 0.816     | 18 | 0.003 |
| Inefficient | Average Trading Volume Activity Before | 0.857     | 5  | 0.216 |
|             | Average Trading Volume Activity After  | 0.770     | 5  | 0.045 |

Table 23 in the Semi-strong category shows that it can be seen that the ATVA before invasion resulted in a p-value of 0.300 indicating that the p-value  $> 0.05$  which means the data is normally distributed and ATVA after invasion produces a p-value of 0.001 indicating a p-value  $< 0.05$  which means data is not normally distributed. Because there is one data that is not normally distributed, the two data will be analyzed using the Wilcoxon Signed Rank Test. Then, in the Weak category, the p-value is 0.001 before invasion and 0.003 after invasion. Both of these data show p-value  $< 0.05$ , which means the data is not normally distributed, so the two data will be analyzed using the Wilcoxon Signed Rank Test. In the Inefficient category, it can be seen that p-value of ATVA before invasion resulted of 0.216, which means that the data was normally distributed because p-value  $> 0.05$  and p-value of ATVA after invasion resulted of 0.045, which means the data was not normally distributed because the p-value  $< 0.05$ . Because there is one data that is not normally distributed, the two data in the Inefficient category will be analyzed using the Wilcoxon Signed Rank Test.

#### 4.3.2 Statistical Hypothesis Test

### 7 Countries as Overall Result

**Table 24 Statistical Hypothesis Test for ATVA of 7 Countries**

| Test Statistics <sup>a</sup> |                          |
|------------------------------|--------------------------|
|                              | ATVA Before – ATVA After |
| Z                            | -3.052 <sup>b</sup>      |
| Asymp. Sig. (2-tailed)       | 0.002                    |

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks

The results of the Wilcoxon Signed Rank Test are shown in Table 24, and it can be observed that the p-value of the two data (represented by Asymp. Sig. 2-tailed) indicates a value of 0.002, which means the p-value is less than 0.05. Therefore,  $H_0$  is rejected, which indicates that research hypothesis which is  $H_7$  is accepted and it means there is a significant difference in trading volume activity before and after the announcement of Russia-Ukraine invasion in 7 countries.

## OPEC – Non OPEC as 1<sup>st</sup> Sub-Sampling

**Table 25 Statistical Hypothesis Test for ATVA of OPEC**

| <b>Test Statistics<sup>a</sup></b> |                          |
|------------------------------------|--------------------------|
|                                    | ATVA Before – ATVA After |
| Z                                  | -.994 <sup>b</sup>       |
| Asymp. Sig. (2-tailed)             | 0.320                    |

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks

The results of the Wilcoxon Signed Rank Test are shown in Table 25, and it can be observed that the p-value of the two sets of data (before-after) reveals a value of 0.320, which indicates that the value is more than 0.05. Therefore, the null hypothesis H<sub>0</sub> is accepted, which indicates that there is no significant difference between the trading volume activity in the OPEC category before the invasion and the average trading volume activity in the OPEC category after the invasion.

**Table 26 Statistical Hypothesis Test for ATVA of Non OPEC**

| <b>Test Statistics<sup>a</sup></b> |                          |
|------------------------------------|--------------------------|
|                                    | ATVA Before – ATVA After |
| Z                                  | -3.180 <sup>b</sup>      |
| Asymp. Sig. (2-tailed)             | 0.001                    |

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks

The results of the Wilcoxon Signed Rank Test are shown in Table 26, and it can be observed that the p-value of the two sets of data (before-after) indicates a value of 0.001, which indicates a significance level of less than 0.05. Therefore, the null hypothesis H<sub>0</sub> is rejected, which indicates that research hypothesis which is H<sub>9</sub> is accepted and it means there is a statistically significant differences in trading volume activity before and after the announcement of invasion in Non OPEC.

## EMH Categories as 2<sup>nd</sup> Sub-Sampling

**Table 27 Statistical Hypothesis Test for ATVA of Semi-Strong**

| Test Statistics <sup>a</sup> |                          |
|------------------------------|--------------------------|
|                              | ATVA Before – ATVA After |
| Z                            | -2.201 <sup>b</sup>      |
| Asymp. Sig. (2-tailed)       | 0.028                    |

a. Wilcoxon Signed Ranks Test  
b. Based on negative ranks

The results of the Wilcoxon Signed Rank Test are shown in Table 27, and it can be observed that the p-value of the two sets of data (before-after) indicates a value of 0.028, which means p-value is less than 0.05. Therefore, the H0 is rejected, which indicates that H10 is accepted and it means there is a statistically significant difference in trading volume activity before and after the announcement of Russia-Ukraine invasion in Semi-Strong countries market form.

**Table 28 Statistical Hypothesis Test for ATVA of Weak**

| Test Statistics <sup>a</sup> |                          |
|------------------------------|--------------------------|
|                              | ATVA Before – ATVA After |
| Z                            | -3.030 <sup>b</sup>      |
| Asymp. Sig. (2-tailed)       | 0.002                    |

a. Wilcoxon Signed Ranks Test  
b. Based on negative ranks

The results of the Wilcoxon Signed Rank Test are shown in Table 28, and it can be observed that the p-value of the two sets of data (before-after) indicates p-value of 0.002, which means the p-value is less than 0.05. Therefore, the null hypothesis H0 is rejected, which indicates that H11 is accepted and it means there is a significant difference in trading volume activity before and after the announcement of Russia-Ukraine in Weak countries market form.

**Table 29 Statistical Hypothesis Test for ATVA of Inefficient**

| Test Statistics <sup>a</sup> |                          |
|------------------------------|--------------------------|
|                              | ATVA Before – ATVA After |
| Z                            | -.944 <sup>b</sup>       |
| Asymp. Sig. (2-tailed)       | 0.345                    |

a. Wilcoxon Signed Ranks Test  
b. Based on negative ranks

In Table 29, the Wilcoxon Signed Rank Test findings reveal that the p-value of the two data sets is 0.345, which means the p-value is more than 0.05. So  $H_0$  is accepted, this indicates that there is no significant difference between the trading volume activity before the announcement of invasion and the average trading volume activity after the announcement of invasion for country that in the Inefficient category.

#### 4.4 Result Discussion

**Table 30 Statistical Hypothesis Conclusion**

|                |             |                   | Type of Testing      | P-Value | Conclusion               |
|----------------|-------------|-------------------|----------------------|---------|--------------------------|
| Overall Result | 7 Countries | AAR Before-After  | Wilcoxon Signed Rank | 0.359   | Insignificant Difference |
|                |             | ATVA Before-After | Wilcoxon Signed Rank | 0.002   | Significant Difference   |
| Sub-Sampling 1 | OPEC        | AAR Before-After  | Wilcoxon Signed Rank | 0.408   | Insignificant Difference |
|                |             | ATVA Before-After | Wilcoxon Signed Rank | 0.32    | Insignificant Difference |
|                | Non OPEC    | AAR Before-After  | Paired T-Test        | 0.618   | Insignificant Difference |
|                |             | ATVA Before-After | Wilcoxon Signed Rank | 0.001   | Significant Difference   |
| Sub-Sampling 2 | Semi-Strong | AAR Before-After  | Paired Sample T-test | 0.261   | Insignificant Difference |
|                |             | ATVA Before-After | Wilcoxon Signed Rank | 0.028   | Significant Difference   |
|                | Weak        | AAR Before-After  | Wilcoxon Signed Rank | 0.136   | Insignificant Difference |
|                |             | ATVA Before-After | Wilcoxon Signed Rank | 0.002   | Significant Difference   |
|                | Inefficient | AAR Before-After  | Wilcoxon Signed Rank | 0.04    | Significant Difference   |
|                |             | ATVA Before-After | Wilcoxon Signed Rank | 0.345   | Insignificant Difference |

Based on Table 30 it can be concluded that the p-value of the average abnormal return for 7 countries is 0.359. Since this p-value is bigger than significant level (0.05), then  $H_0$

is accepted. This means that there is no significant difference between 5 days before and 5 days after the announcement of Russia-Ukraine invasion. Also, all of the results of the first sub-sampling data also show the same result that stocks listed in OPEC and Non-OPEC countries are not found to have a significant differences average abnormal return. Then, in the second sub-sampling on semi-strong and weak markets, no significant average abnormal return was found.

The findings may happen because there is a news that has been circulating before the announcement that Russia has officially invaded Ukraine. The news contains information that Russia had occupied the Russia-Ukraine border and this sparked the issue that Russia would invade Ukraine in the near future, even so the Russian president, Vladimir Putin, said that Russia did not want war but rather negotiations. However, a number of parties, including the United States, do not believe this (CNN Indonesia). From this widespread issue, it is assumed that investors predict that Russia will invade Ukraine so that when there is information that Russia has officially invaded Ukraine, the information is no longer considered new information so it does not generate significant abnormal returns.

As in previous research conducted by Saputra, et al. (2021) that there is no significant difference in abnormal return because coronavirus cases have been announced since December 2019 so investors in Indonesia predict that the coronavirus pandemic will soon spread in Indonesia, therefore the result shows that there is no significant difference abnormal return before and after event. Political events will still produce significant abnormal returns if the event cannot be predicted in advance. As discovered by Kollias et al. (2011) which found there is significant abnormal return before and after terrorist attacks, Bash and Alsaifi (2019) which found there is significant abnormal return before and after disappearance of one of journalist in Saudi Arabia, Papakyriakou, et al. (2020) who found there is significant abnormal return before and after terrorist attacks in G7 countries. This might happen because terrorist attacks or disappearance of someone cannot be predicted before.

However, there is one difference in the results of the second sub-sampling, that the market with an inefficient form shows a significant difference in the average abnormal return before and after the event. It might be occurred because there is a high level of asymmetric information, which occurs in inefficient markets.

Then, based on table 30 also, there is a significant difference in average trading volume activity in 7 countries because the result of p-value (0.002) is less than 0.05. Also, in the first sub-sampling, Non OPEC shows the same result that there is a significant difference in the average trading volume activity. Then, almost all data in the second sub-sampling, which is markets with semi-strong and weak forms, also showed the same results as the overall results (7 countries).

However, the results from the first sub-sampling, namely OPEC, showed different results from overall result (7 countries) because OPEC shows that there is no significant difference in average trading volume activity. This might happen because oil and gas stocks in these countries are regulated by OPEC since the mission of OPEC is to coordinate and unify the petroleum policies of its Member States and ensure the stabilization of the oil market in order to secure an efficient, economical and orderly supply of oil (OPEC.org). So because of that investors might seem not bothered by the Russia-Ukraine invasion announcement and that's why there is no significant transaction that happened. Also, in the second sub-sampling which is an inefficient market shows that there is no significant difference in average trading volume activity. The absence of significant differences in trading volume activity shows that investors in countries with inefficient forms do not react immediately to make stock transactions.

However, significant differences were found in the average trading volume activity in the overall results (7 countries) and similar results were found for stocks in Non-OPEC countries, markets with semi-strong and weak form. This indicates that information of the announcement of the invasion event is relevant for investors so that it makes investors to conduct stock transactions in the oil and gas sector and probably because Russia is the third largest oil supplier in the world and when this event affects the supply of oil, the event influence investors to make transactions. This result also supports by Saputra, et al. (2021) that there is a significant difference in trading volume activity before and after the announcement of the coronavirus spreading for the first time in Indonesia on pharmaceutical stocks.



## CHAPTER 5

### CONCLUSION AND RECOMMENDATION

#### 5.1 Conclusion

This research is motivated by the occurrence of the Russian invasion of Ukraine on February 24, when Russia officially sent a large military force to attack Ukraine. This caused oil prices to increase drastically globally by US\$ 100 per barrel, this price increase was influenced by 12% of global oil obtained from Russia or in the sense that Russia is the third largest oil exporter in the world. Therefore, the question arises how the market reacts to oil and gas stocks in 7 countries such as Saudi Arabia, the United States, Canada, the UAE, Nigeria, Kuwait, Norway where 50% of the world's oil is obtained from these countries after the announcement of the Russia-Ukraine invasion in February 24, 2022.

From this research can be conclude that the results of the first hypothesis is rejected, meaning that there is no significant difference in abnormal returns before and after the announcement of the Russia-Ukraine invasion. This indicates that investors are probably due to the pre-event information that there is news that Russia is on the Russia-Ukraine border so information about the announcement of the Russian-Ukrainian invasion is not new to investors. However this condition were not founded in the Inefficient form of capital market this probably pre-event information which was spread to investors in the semi-strong and weak form did not reach investors in the inefficient market.

Then, the results of this study accepted the second hypothesis, meaning that there is significant difference in trading volume activity before and after the announcement of the Russia-Ukraine invasion. This indicates that this event considered as relevant information for investor that affects investors in having transaction of share in the oil and gas sector. However, this research found that the differences between TVA before and after is not significant for firms in the OPEC countries and firms in the inefficient market form countries. The reason OPEC countries show insignificant results on TVA between before and after the announcement of invasion is probably because investors think that OPEC will intervene in oil and gas policies so that the invasion event does not affect the performance of oil and gas companies in OPEC countries. In the inefficient market

form countries, the insignificant differences in TVA before-after invasion, this is because the information obtained by investors does not influence investors to react immediately in conducting stock transactions.

## **5.2 Recommendation**

Based on the results of this study, the authors suggest several things to investors as market players, as follows:

1. Investors will not get abnormal returns from predictable political events. So abnormal returns can be obtained from events that cannot be predicted in advance. Except in an inefficient market.
2. The political event will not affect the market reaction if there is an industry association whose purpose is to maintain the stability of the industry. Thus, when there is a political event that occurs, investors will not get an abnormal return because the existing information has no effect because it is irrelevant.

## REFERENCE

- Ajao, M.G. and Osayuwu, R. (2012). Testing the Weak Form of Efficient Market Hypothesis in Nigerian Capital Market. *Accounting and Finance Research*, 1(1). doi:10.5430/afr.v1n1p169.
- Alexeev, V. and Tapon, F. (2011). Testing weak form efficiency on the Toronto Stock Exchange. *Journal of Empirical Finance*, 18(4), pp.661–691. doi:10.1016/j.jempfin.2011.05.002.
- Arif Budiarto dan Zaki Baridwan, (2000). Pengaruh Pengumuman Right Issue Terhadap Tingkat Keuntungan dan Likuiditas Saham. *Jurnal Akuntansi Indonesia*, Vol.2 No.1, Januari.
- Asiri, B. and Alzeera, H. (2013). *Is the Saudi Stock Market Efficient? A Case of Weak-Form Efficiency*. [online] papers.ssrn.com. Available at: <https://ssrn.com/abstract=2276520> [Accessed 10 Jun. 2022].
- Astakhova, O., Lawler, A. and Ghaddar, A. (2022). OPEC+ deal seen on track despite Russia's Ukraine invasion -sources. *Reuters*. [online] 25 Feb. Available at: <https://www.reuters.com/business/energy/opec-deal-seen-track-despite-russias-ukraine-invasion-sources-2022-02-25/> [Accessed 30 Jun. 2022].
- Azis, M., Mintarti, S., & Nadir, M. (2015). *Investment Management: Fundamental, Technical, Investor Behavior and Stock Returns*. Yogyakarta, Indonesia: Deepublish Publisher.
- Bash, A. and Alsaifi, K. (2019). Fear from uncertainty: An event study of Khashoggi and stock market returns. *Journal of Behavioral and Experimental Finance*, 23, pp.54–58. doi:10.1016/j.jbef.2019.05.004.
- Bodie, Z., Kane, A. and Marcus, A.J. (2005). *Investment*. New York: McGraw-Hill/Irwin, p.371.
- Boungou, Whelsy, and Alhonita Yatié. "The Impact of the Ukraine–Russia War on World Stock Market Returns." *Economics Letters*, vol. 215, Apr. 2022, p. 110516, 10.1016/j.econlet.2022.110516.
- Brown, S. J., & Warner, J. B. (1985). Using daily stock returns, the case of event studies. *Journal of Financial Economics*, 14(1), 3–31.
- Campbell, C.J., Cowan, A.R. and Salotti, V. (2010). Multi-Country Event Study Methods. *SSRN Electronic Journal*. doi:10.2139/ssrn.1359798.

- Chowdhury, E.K. and Abedin, M.Z. (2020). COVID-19 Effects on the US Stock Index Returns: An Event Study Approach. *Accounting, Auditing & Accountability Journal*. doi:10.2139/ssrn.3611683.
- Damodaran, Aswath. 2002. *Investment Valuation : Tools and Techniques for Determining the Value of Any Asset*. 2nd Edition. New York : John Willey & Sons, Inc
- Ellyatt, H. (2022). *Russian forces invade Ukraine*. [online] CNBC. Available at: <https://www.cnbc.com/2022/02/24/russian-forces-invade-ukraine.html>.
- IEA. (n.d.). *Russia's War on Ukraine – Topics*. [online] Available at: <https://www.iea.org/topics/russia-s-war-on-ukraine>
- Fama, E. F. (1965). The Behavior of Stock-Market Prices. *The Journal of Business* Vol. 38, 34-105.
- Goel, S., Cagle, S. and Shawky, H. (2017) 'How vulnerable are international financial markets to terrorism? An empirical study based on terrorist incidents worldwide', *Journal of Financial Stability*, Vol. 33, pp. 120–132
- Hartono, Jogyanto. (2003). *Teori Portofolio dan Analisis Investasi*. 3<sup>rd</sup> ed. Yogyakarta: Badan Penerbit Fakultas Ekonomi Universitas Gadjah Mada.
- Hillier, D. and Loncan, T. (2019) 'Political uncertainty and Stock returns: Evidence from the Brazilian Political Crisis', *Pacific Basin Finance Journal*, Vol. 54, pp. 1–12
- Hudson, R. and Urquhart, A. (2015). War and stock markets: The effect of World War Two on the British stock market. *International Review of Financial Analysis*, 40, pp.166–177. doi:10.1016/j.irfa.2015.05.015.
- Husnan, S. (2015). *Dasar-dasar Teori Portfolio & Analisis Sekuritas*. 5th ed. Yogyakarta: UPP STIM YKPN.
- Institute, E. (n.d.). *Oil and gas*. [online] Energy Institute. Available at: <https://www.energyinst.org/exploring-energy/topic/oil-and-gas>.
- Kollias, C., Papadamou, S. and Stagiannis, A. (2011). Terrorism and capital markets: The effects of the Madrid and London bomb attacks. *International Review of Economics & Finance*, 20(4), pp.532–541. doi:10.1016/j.iref.2010.09.004.
- Levy, H. and Internet Archive (1996). *Introduction to investments*. [online] *Internet Archive*. Cincinnati, Ohio : South-Western College Pub. Available at:

- <https://archive.org/details/introductiontoin00levy/page/n1031/mode/2up> [Accessed 11 April. 2022].
- Mcclay, R. (2022). *How the Oil and Gas Industry Works*. [online] Investopedia. Available at: <https://www.investopedia.com/investing/oil-gas-industry-overview/#citation-11>.
- Mackinlay, A. (1997). Event Studies in Economics and Finance. *Journal of Economic Literature*, [online] 35(1), pp.13–39. Available at: [http://www.business.unr.edu/faculty/liuc/files/BADM742/MacKinlay\\_1997.pdf](http://www.business.unr.edu/faculty/liuc/files/BADM742/MacKinlay_1997.pdf) [Accessed 29 April. 2022].
- Mahendra, I. K., & Rasmini, N. K. (2019). Market Reaction to the Increase of Bank Indonesia 7-Day Reverse Repo Rate on 15 August 2018. *E-Jurnal Akuntansi Universitas Udayana*, 27(3), 2066–2099. doi:<https://doi.org/10.24843/EJA.2019.v27.i03.p16>
- Markowitz, H. (1952). Portfolio Selection. *Journal of Finance*, 7(1), pp.77. doi:10.2307/2975974.
- Mojanoski, G. (2022). Event Study on The Reaction of The Emerging Stock Markets to The War Intervention. In: *Proceedings of the ISCCRO - International Statistical Conference in Croatia*. The 4th International Statistical Conference in Croatia. ISCCRO, pp.19–24.
- Moustafa, M.A. (2004). *Testing the Weak-Form Efficiency of the United Arab Emirates Stock Market*. [online] papers.ssrn.com. Available at: <https://ssrn.com/abstract=551102> [Accessed 9 Jun. 2022].
- Nur, A. M., & Dadan, R. (2017). Analysis Of Abnormal Return, Stock Return And Stock Liquidity Before And After Buyback Share: Case Study Of Companies Listed In Indonesia Stock Exchange In Period Of 2011-2015. *Russian Journal of Agricultural and Socio-Economic Sciences*.
- Nurhaeni, N. (2010). Dampak Pemilihan Umum Legislatif Indonesia tahun 2009 terhadap abnormal return dan aktivitas volume perdagangan Saham di BEI. *Master Thesis, Universitas Diponegoro, 2009*. Semarang: Universitas Diponegoro.
- OECD - The Observatory of Economic Complexity. (2020). *Crude Petroleum | OEC*. [online] Available at: <https://oec.world/en/profile/hs/crude-petroleum>.
- OPEC (2019). *OPEC : Our Mission*. [online] Opec.org. Available at: [https://www.opec.org/opec\\_web/en/about\\_us/23.htm](https://www.opec.org/opec_web/en/about_us/23.htm).
- Papakyriakou, P., Sakkas, A. and Taoushianis, Z. (2019). The impact of terrorist attacks in G7 countries on international stock markets and the role of investor sentiment. *Journal of International Financial Markets*,

- Institutions and Money*, [online] 61, pp.143–160. doi:10.1016/j.intfin.2019.03.001.
- Razali, N. M., & Wah, Y. B. (2011). Power Comparisons of Shapiro-Wilk, Kolmogorov-Smirnov; Lilliefors and Anderson-Darling Tests. *Journal of Statistical Modelling and Analytics*, 21-33.
- Reuters (2022). Europe at war: Six charts to know in financial markets. *Reuters*. [online] 26 Feb. Available at: <https://www.reuters.com/markets/europe/europe-war-six-charts-know-financial-markets-2022-02-26/#main-content>.
- Sabbaghi, O. and Sabbaghi, N. (2018). Market efficiency and the global financial crisis: evidence from developed markets. *Studies in Economics and Finance*, 35(3), pp.362–385. doi:10.1108/sef-01-2014-0022.
- SAPUTRA G, E.F., PULUNGAN, N.A.F. and SUBIYANTO, B. (2021). The Relationships between Abnormal Return, Trading Volume Activity and Trading Frequency Activity during the COVID-19 in Indonesia. *Journal of Asian Finance, Economics and Business*, [online] 8(2), pp.0737–0745. Available at: [https://www.researchgate.net/publication/349670131\\_The\\_Relationships\\_between\\_Abnormal\\_Return\\_Trading\\_Volume\\_Activity\\_and\\_Trading\\_Frequency\\_Activity\\_during\\_the\\_COVID-19\\_in\\_Indonesia](https://www.researchgate.net/publication/349670131_The_Relationships_between_Abnormal_Return_Trading_Volume_Activity_and_Trading_Frequency_Activity_during_the_COVID-19_in_Indonesia).
- Schakib, S.K. (2017). *How terrorist attacks influence the stock markets in France — an event study from different industrial perspectives*. University of Amsterdam.
- Setiadi, E. (2022). *Invasi Rusia dan Dampaknya Terhadap Geopolitik Global*. [online] CNBC Indonesia. Available at: <https://www.google.com/url?q=https://www.cnbcindonesia.com/opini/20220307124740-14-320589/invasi-rusia-dan-dampaknya-terhadap-geopolitik-global&sa=D&source=docs&ust=1655403009150411&usg=AOvVaw21HrUiGcwUOYp1Jdl2fAU> [Accessed 5 March. 2022].
- Sunariyah. (2006). *Introduction to Capital Market Knowledge*, Fifth Edition. Yogyakarta: UPP STIM YKPN.
- Syed, A.M. and Bajwa, I.A. (2018). Earnings announcements, stock price reaction and market efficiency – the case of Saudi Arabia. *International Journal of Islamic and Middle Eastern Finance and Management*, 11(3), pp.416–431. doi:10.1108/imefm-02-2017-0044.
- Tandelilin, Eduardus. (2010). *Portfolio and Investment, Theory and Application*. First Edition. Yogyakarta: Kanisius.

- Twin, A. (2019). *World's Top 10 Oil Exporters*. [online] Investopedia. Available at: [https://www.investopedia.com/articles/company-insights/082316/worlds-top 10-oil-exporters.asp](https://www.investopedia.com/articles/company-insights/082316/worlds-top-10-oil-exporters.asp).
- www.ibisworld.com. (n.d.). *IBISWorld - Industry Market Research, Reports, and Statistics*. [online] Available at: <https://www.ibisworld.com/global/market-research-reports/global-oil-gas-exploration-production-industry/>.
- Yasa, G.E. and Sari, M.M.R. (2020). Analysis of Market Reaction on Wall Street Attenuation in Indonesia. *American Journal of Humanities and Social Sciences Research (AJHSSR)*, 4(8), pp.475–481.
- Yousaf, I., Patel, R. and Yarovaya, L. (2022). The Reaction of G20+ Stock Markets to the Russia-Ukraine Conflict 'Black-Swan' Event: Evidence From Event Study Approach. *SSRN Electronic Journal*. doi:10.2139/ssrn.4069555.

*This page is intentionally left blank*



## APPENDIX A

### MARKET CAPITALIZATION OF OIL & GAS SECTOR

#### Saudi Arabia

Total Market Capital of Oil & Gas Sector: \$2,389,000,500,000.00

| No | Oil and Gas Companies       | Market Capital (\$) | Percent |
|----|-----------------------------|---------------------|---------|
| 1  | Saudi Aramco                | 2,376,000,000,000   | 99.46%  |
| 2  | Petro Rabigh                | 5,490,000,000       | 0.23%   |
| 3  | ALDREES                     | 5,565,000,000       | 0.23%   |
| 4  | Saudi Arabia Refineries Co  | 1,566,000,000       | 0.07%   |
| 5  | Natural Gas Distribution Co | 379,500,000         | 0.02%   |

#### United States of America (USA)

Total Market Capital of Oil & Gas Sector: \$2,090,120,000,000

| No | Oil and Gas Companies    | Market Capital (\$) | Percent  |
|----|--------------------------|---------------------|----------|
| 1  | Exxon                    | 406,930,000,000     | 19.4692% |
| 2  | Chevron                  | 344,640,000,000     | 16.4890% |
| 3  | Conoco                   | 143,830,000,000     | 6.8814%  |
| 4  | pioneer                  | 67,230,000,000      | 3.2166%  |
| 5  | Schlumberger             | 63,670,000,000      | 3.0462%  |
| 6  | occidental petro         | 62,220,000,000      | 2.9769%  |
| 7  | Duke Energy              | 86,520,000,000      | 4.1395%  |
| 8  | Southern Comp            | 75,690,000,000      | 3.6213%  |
| 9  | enterprise products      | 59,610,000,000      | 2.8520%  |
| 10 | sempra                   | 52,400,000,000      | 2.5070%  |
| 11 | valero                   | 51,960,000,000      | 2.4860%  |
| 12 | EOG                      | 77,940,000,000      | 3.7290%  |
| 13 | phillips 66              | 47,660,000,000      | 2.2803%  |
| 14 | williams                 | 44,680,000,000      | 2.1377%  |
| 15 | baker hughes             | 38,710,000,000      | 1.8520%  |
| 16 | hess                     | 37,120,000,000      | 1.7760%  |
| 17 | energy transfer          | 35,290,000,000      | 1.6884%  |
| 18 | mplx                     | 32,600,000,000      | 1.5597%  |
| 19 | oneok                    | 29,090,000,000      | 1.3918%  |
| 20 | coterra                  | 27,340,000,000      | 1.3081%  |
| 21 | cheniere                 | 26,330,000,000      | 1.2597%  |
| 22 | diamondback              | 25,150,000,000      | 1.2033%  |
| 23 | pacific gas and electric | 24,160,000,000      | 1.1559%  |

|    |                      |                |         |
|----|----------------------|----------------|---------|
| 24 | marathon             | 20,530,000,000 | 0.9822% |
| 25 | ovintiv              | 13,180,000,000 | 0.6306% |
| 26 | antero               | 12,960,000,000 | 0.6201% |
| 27 | chesapeake           | 12,620,000,000 | 0.6038% |
| 28 | magellan             | 10,570,000,000 | 0.5057% |
| 29 | range resources      | 8,830,000,000  | 0.4225% |
| 30 | plains all american  | 7,860,000,000  | 0.3761% |
| 31 | NOV                  | 7,530,000,000  | 0.3603% |
| 32 | Magnolia Oil         | 7,040,000,000  | 0.3368% |
| 33 | Matador              | 6,580,000,000  | 0.3148% |
| 34 | Civitas Resources    | 6,120,000,000  | 0.2928% |
| 35 | DT Midstream         | 5,500,000,000  | 0.2631% |
| 36 | SM Energy            | 5,280,000,000  | 0.2526% |
| 37 | Helmerich            | 5,230,000,000  | 0.2502% |
| 38 | Antero Midstream     | 5,010,000,000  | 0.2397% |
| 39 | Comstock             | 4,360,000,000  | 0.2086% |
| 40 | PBF Energy           | 3,820,000,000  | 0.1828% |
| 41 | Denbury              | 3,730,000,000  | 0.1785% |
| 42 | Kosmos               | 3,440,000,000  | 0.1646% |
| 43 | California Resources | 3,410,000,000  | 0.1631% |
| 44 | NorthWestern         | 3,360,000,000  | 0.1608% |
| 45 | Black STone          | 3,240,000,000  | 0.1550% |
| 46 | Whiting              | 3,200,000,000  | 0.1531% |
| 47 | Callon Petroleum     | 3,180,000,000  | 0.1521% |
| 48 | Liberty Oilfield     | 3,060,000,000  | 0.1464% |
| 49 | HighPeak Energy      | 3,050,000,000  | 0.1459% |
| 50 | Crestwood            | 2,880,000,000  | 0.1378% |
| 51 | NexTier              | 2,670,000,000  | 0.1277% |
| 52 | Tellurian            | 2,600,000,000  | 0.1244% |
| 53 | Delek                | 2,500,000,000  | 0.1196% |
| 54 | Chesapeake Utilities | 2,360,000,000  | 0.1129% |
| 55 | Northern Oil         | 2,290,000,000  | 0.1096% |
| 56 | Weatherford          | 2,270,000,000  | 0.1086% |
| 57 | Delek US             | 2,040,000,000  | 0.0976% |
| 58 | RPC                  | 1,980,000,000  | 0.0947% |
| 59 | Brigham Minerals     | 1,810,000,000  | 0.0866% |
| 60 | Talos Energy         | 1,780,000,000  | 0.0852% |

|    |                                   |               |         |
|----|-----------------------------------|---------------|---------|
| 61 | Kinetik                           | 1,590,000,000 | 0.0761% |
| 62 | Expro Group                       | 1,570,000,000 | 0.0751% |
| 63 | Genesis Energy                    | 1,450,000,000 | 0.0694% |
| 64 | Earthstone Energy                 | 1,360,000,000 | 0.0651% |
| 65 | ProPetro                          | 1,340,000,000 | 0.0641% |
| 66 | Diversified Energy                | 1,320,000,000 | 0.0632% |
| 67 | Laredo Petroleum                  | 1,220,000,000 | 0.0584% |
| 68 | NOW Inc.                          | 1,170,000,000 | 0.0560% |
| 69 | Clean Energy Fuels                | 1,110,000,000 | 0.0531% |
| 70 | Dril-Quip                         | 1,060,000,000 | 0.0507% |
| 71 | Calumet Specialty                 | 1,030,000,000 | 0.0493% |
| 72 | PBF Logistics                     | 1,020,000,000 | 0.0488% |
| 73 | NextDecade Corp                   | 940,000,000   | 0.0450% |
| 74 | Vertex Energy                     | 920,000,000   | 0.0440% |
| 75 | Unitil                            | 910,000,000   | 0.0435% |
| 76 | W&T Offshore                      | 900,000,000   | 0.0431% |
| 77 | SandRidge Energy                  | 860,000,000   | 0.0411% |
| 78 | Cross America Partners            | 810,000,000   | 0.0388% |
| 79 | Ranger Oil                        | 800,000,000   | 0.0383% |
| 80 | Excelerate Energy                 | 700,000,000   | 0.0335% |
| 81 | ProFrac                           | 690,000,000   | 0.0330% |
| 82 | Helix Energy Solutions            | 690,000,000   | 0.0330% |
| 83 | National Energy Services Reunited | 670,000,000   | 0.0321% |
| 84 | Dorian LPG                        | 660,000,000   | 0.0316% |
| 85 | SilverBow Resources               | 660,000,000   | 0.0316% |
| 86 | Riley Permian                     | 520,000,000   | 0.0249% |
| 87 | Oil States International          | 460,000,000   | 0.0220% |
| 88 | Ring Energy                       | 450,000,000   | 0.0215% |
| 89 | Newpark Resources                 | 400,000,000   | 0.0191% |
| 90 | Vaalco Energy                     | 400,000,000   | 0.0191% |
| 91 | Falcon Minerals                   | 330,000,000   | 0.0158% |
| 92 | Amplify Energy                    | 320,000,000   | 0.0153% |
| 93 | Green Plains Partners             | 290,000,000   | 0.0139% |
| 94 | Camber Energy                     | 270,000,000   | 0.0129% |
| 95 | Trecora Resources                 | 230,000,000   | 0.0110% |
| 96 | RGC Resources                     | 190,000,000   | 0.0091% |
| 97 | Exterran                          | 190,000,000   | 0.0091% |

|     |                            |             |         |
|-----|----------------------------|-------------|---------|
| 98  | Summit Midstream           | 190,000,000 | 0.0091% |
| 99  | Genie Energy               | 190,000,000 | 0.0091% |
| 100 | Blueknight Energy Partners | 180,000,000 | 0.0086% |
| 101 | Overseas Shipholding Group | 180,000,000 | 0.0086% |
| 102 | CSI Compressco             | 180,000,000 | 0.0086% |
| 103 | Martin Midstream Partners  | 150,000,000 | 0.0072% |
| 104 | Smart Sand                 | 140,000,000 | 0.0067% |
| 105 | Forum Energy               | 130,000,000 | 0.0062% |
| 106 | Zion Oil & Gas             | 110,000,000 | 0.0053% |
| 107 | PEDEVCO                    | 100,000,000 | 0.0048% |
| 108 | Nine ENergy                | 90,000,000  | 0.0043% |
| 109 | NCS Multistage             | 80,000,000  | 0.0038% |
| 110 | Stabilis Solutions         | 80,000,000  | 0.0038% |
| 111 | KLX Energy Services        | 60,000,000  | 0.0029% |
| 112 | Gulf Island Fabrication    | 50,000,000  | 0.0024% |
| 113 | U.S. Well Services         | 40,000,000  | 0.0019% |
| 114 | Houston American           | 20,000,000  | 0.0010% |
| 115 | ION Gephysical             | 10,000,000  | 0.0005% |

## Canada

Total Market Capital of Oil & Gas Sector: \$569,140,678,508

| No | Oil and Gas Companies      | Market Capital | Percent |
|----|----------------------------|----------------|---------|
| 1  | Enbridge                   | 91,380,000,000 | 16.056% |
| 2  | Canadian Natural Resources | 75,040,000,000 | 13.185% |
| 3  | TC Energy                  | 55,960,000,000 | 9.832%  |
| 4  | Suncor Energy              | 55,730,000,000 | 9.792%  |
| 5  | Cenovus Energy             | 43,410,000,000 | 7.627%  |
| 6  | Imperial Oil               | 35,880,000,000 | 6.304%  |
| 7  | Pembina                    | 21,990,000,000 | 3.864%  |
| 8  | Tourmaline Oil             | 19,920,000,000 | 3.500%  |
| 9  | ARC Resources              | 10,020,000,000 | 1.761%  |
| 10 | Alta Gas                   | 6,450,000,000  | 1.133%  |
| 11 | Keyera                     | 5,770,000,000  | 1.014%  |
| 12 | Whitecap Resources         | 5,240,000,000  | 0.921%  |
| 13 | MEG Energy                 | 5,220,000,000  | 0.917%  |
| 14 | Crescent Point Energy      | 4,830,000,000  | 0.849%  |
| 15 | Parkland Corp              | 43,800,000,000 | 7.696%  |

|    |                                     |               |        |
|----|-------------------------------------|---------------|--------|
| 16 | ATCO                                | 4,260,000,000 | 0.748% |
| 17 | Paramount                           | 3,890,000,000 | 0.683% |
| 18 | Vermilion Energy                    | 3,580,000,000 | 0.629% |
| 19 | PraireSky Royalty                   | 3,500,000,000 | 0.615% |
| 20 | Enerplus                            | 3,410,000,000 | 0.599% |
| 21 | Baytex Energy                       | 3,060,000,000 | 0.538% |
| 22 | Gibson Energy                       | 2,970,000,000 | 0.522% |
| 23 | Birchcliff Energy                   | 2,380,000,000 | 0.418% |
| 24 | Tamarack Valley                     | 1,720,000,000 | 0.302% |
| 25 | Secure Energy                       | 1,700,000,000 | 0.299% |
| 26 | Advantage Energy                    | 1,550,000,000 | 0.272% |
| 27 | ReconAfrica                         | 790,000,000   | 0.139% |
| 28 | Obisidian Energy                    | 720,000,000   | 0.127% |
| 29 | Teekay Tankers                      | 710,000,000   | 0.125% |
| 30 | Gran Tierra Energy                  | 610,000,000   | 0.107% |
| 31 | Teekay                              | 350,000,000   | 0.061% |
| 32 | Wolverine Energy                    | 9,030,000     | 0.002% |
| 33 | Africa Oil Corp.                    | 1,259,651,321 | 0.221% |
| 34 | Athabasca Oil Corporation           | 1,308,317,522 | 0.230% |
| 35 | Bengal Energy Ltd.                  | 63,089,548    | 0.011% |
| 36 | Bonterra Energy Corp                | 417,433,595   | 0.073% |
| 37 | Canacol Energy Ltd.                 | 486,947,928   | 0.086% |
| 38 | Cardinal Energy Ltd.                | 1,046,498,187 | 0.184% |
| 39 | Crescent Point Energy Corp.         | 5,096,582,891 | 0.895% |
| 40 | Crew Energy Inc.                    | 790,945,140   | 0.139% |
| 41 | Forza Petroleum Limited             | 116,995,240   | 0.021% |
| 42 | Freehold Royalties Ltd.             | 2,256,378,738 | 0.396% |
| 43 | Frontera Energy Corporation         | 1,300,992,166 | 0.229% |
| 44 | Gear Energy Ltd.                    | 388,530,985   | 0.068% |
| 45 | Headwater Exploration Inc.          | 1,483,311,203 | 0.261% |
| 46 | i3 Energy plc                       | 325,525,489   | 0.057% |
| 47 | InPlay Oil Corp.                    | 335,764,922   | 0.059% |
| 48 | International Petroleum Corporation | 1,855,372,300 | 0.326% |
| 49 | Journey Energy Inc.                 | 252,947,198   | 0.044% |
| 50 | Kelt Exploration Ltd.               | 1,261,949,599 | 0.222% |
| 51 | Kolibri Global Energy Inc.          | 90,820,570    | 0.016% |
| 52 | NuVista Energy Ltd.                 | 2,504,054,841 | 0.440% |

|    |                                       |               |        |
|----|---------------------------------------|---------------|--------|
| 53 | Obsidian Energy Ltd.                  | 854,294,644   | 0.150% |
| 54 | Paramount Resources Ltd.              | 4,395,116,228 | 0.772% |
| 55 | Parex Resources Inc.                  | 2,914,983,198 | 0.512% |
| 56 | Perpetual Energy Inc.                 | 51,279,114    | 0.009% |
| 57 | Petrus Resources Ltd.                 | 233,046,545   | 0.041% |
| 58 | Peyto Exploration & Development Corp. | 2,215,494,346 | 0.389% |
| 59 | Pieridae Energy Limited               | 149,797,777   | 0.026% |
| 60 | Pine Cliff Energy Ltd.                | 527,698,861   | 0.093% |
| 61 | Pipestone Energy Corp.                | 922,189,151   | 0.162% |
| 62 | Prairie Provident Resources Inc.      | 31,575,970    | 0.006% |
| 63 | PrairieSky Royalty Ltd.               | 4,210,091,601 | 0.740% |
| 64 | Questerre Energy Corporation          | 85,703,167    | 0.015% |
| 65 | Rubellite Energy Inc.                 | 247,892,635   | 0.044% |
| 66 | Spartan Delta Corp.                   | 1,814,004,029 | 0.319% |
| 67 | Surge Energy Inc.                     | 899,410,305   | 0.158% |
| 68 | Topaz Energy Corp.                    | 3,176,605,029 | 0.558% |
| 69 | Touchstone Exploration Inc.           | 304,075,479   | 0.053% |
| 70 | TransGlobe Energy Corporation         | 415,791,183   | 0.073% |
| 71 | Valeura Energy Inc.                   | 43,292,495    | 0.008% |
| 72 | Yangarra Resources Ltd.               | 264,095,790   | 0.046% |
| 73 | Africa Energy Corp.                   | 391,608,851   | 0.069% |
| 74 | Alpine Summit Energy Partners, Inc.   | 173,122,357   | 0.030% |
| 75 | Altima Resources Ltd.                 | 2,240,872     | 0.000% |
| 76 | Alvopetro Energy Ltd.                 | 183,290,818   | 0.032% |
| 77 | Arrow Exploration Corp.               | 53,453,661    | 0.009% |
| 78 | Avanti Energy Inc.                    | 89,035,874    | 0.016% |
| 79 | Canadian Spirit Resources Inc.        | 29,499,534    | 0.005% |
| 80 | Centaurus Energy Inc.                 | 5,440,541     | 0.001% |
| 81 | CGX Energy Inc.                       | 460,141,859   | 0.081% |
| 82 | Claren Energy Corp.                   | 139,721       | 0.000% |
| 83 | Cobra Venture Corporation             | 3,578,343     | 0.001% |
| 84 | Crown Point Energy Inc.               | 25,516,063    | 0.004% |
| 85 | Cub Energy Inc.                       | 6,284,307     | 0.001% |
| 86 | Cypress Hills Resource Corp.          | 5,396,481     | 0.001% |
| 87 | Desert Mountain Energy Corp.          | 245,954,570   | 0.043% |
| 88 | East West Petroleum Corp.             | 7,614,782     | 0.001% |

|     |                                        |               |        |
|-----|----------------------------------------|---------------|--------|
| 89  | Eco (Atlantic) Oil & Gas Ltd.          | 166,942,059   | 0.029% |
| 90  | EF EnergyFunders Ventures, Inc.        | 10,865,694    | 0.002% |
| 91  | Falcon Oil & Gas Ltd.                  | 203,647,748   | 0.036% |
| 92  | First Helium Inc.                      | 51,991,017    | 0.009% |
| 93  | Goldeneye Resources Corp.              | 1,484,817     | 0.000% |
| 94  | Guardian Exploration Inc.              | 5,004,825     | 0.001% |
| 95  | Helium Evolution Incorporated          | 25,196,312    | 0.004% |
| 96  | Hemisphere Energy Corporation          | 135,014,453   | 0.024% |
| 97  | Highwood Asset Management Ltd.         | 64,650,113    | 0.011% |
| 98  | Huntington Exploration Inc.            | 19,064,163    | 0.003% |
| 99  | Imperial Helium Corp.                  | 20,814,855    | 0.004% |
| 100 | International Frontier Resources Corp. | 4,486,619     | 0.001% |
| 101 | Jericho Energy Ventures Inc.           | 101,375,176   | 0.018% |
| 102 | Jura Energy Corporation                | 10,361,449    | 0.002% |
| 103 | Leucrotta Exploration Inc.             | 507,268,707   | 0.089% |
| 104 | Marksmen Energy Inc.                   | 9,785,936     | 0.002% |
| 105 | Metalore Resources Limited             | 4,455,338     | 0.001% |
| 106 | New Zealand Energy Corp.               | 3,713,975     | 0.001% |
| 107 | Nexera Energy Inc.                     | 2,185,194     | 0.000% |
| 108 | NG Energy International Corp.          | 147,112,186   | 0.026% |
| 109 | Orca Energy Group Inc.                 | 155,021,316   | 0.027% |
| 110 | Pan Orient Energy Corp.                | 48,384,577    | 0.009% |
| 111 | Pennine Petroleum Corporation          | 5,015,367     | 0.001% |
| 112 | Perisson Petroleum Corporation         | 36,486,263    | 0.006% |
| 113 | PetroFrontier Corp.                    | 23,368,511    | 0.004% |
| 114 | Petrolympic Ltd.                       | 7,074,634     | 0.001% |
| 115 | PetroShale Inc.                        | 405,424,045   | 0.071% |
| 116 | PetroTal Corp.                         | 526,824,535   | 0.093% |
| 117 | Petro-Victory Energy Corp.             | 79,269,106    | 0.014% |
| 118 | Petrox Resources Corp.                 | 1,378,306     | 0.000% |
| 119 | Phoenix Canada Oil Company Limited     | 6,537,952     | 0.001% |
| 120 | Pinedale Energy Limited                | 4,498,885     | 0.001% |
| 121 | Prospera Energy Inc.                   | 8,345,720     | 0.001% |
| 122 | Pulse Oil Corp.                        | 15,159,236    | 0.003% |
| 123 | Razor Energy Corp.                     | 63,415,348    | 0.011% |
| 124 | Reconnaissance Energy Africa Ltd.      | 1,379,804,252 | 0.242% |
| 125 | ROK Resources Inc.                     | 19,362,610    | 0.003% |

|     |                               |             |        |
|-----|-------------------------------|-------------|--------|
| 126 | Royal Helium Ltd.             | 61,378,942  | 0.011% |
| 127 | Samoth Oilfield Inc.          | 2,199,734   | 0.000% |
| 128 | Saturn Oil & Gas Inc.         | 93,848,797  | 0.016% |
| 129 | ShaMaran Petroleum Corp.      | 200,967,269 | 0.035% |
| 130 | Sintana Energy Inc.           | 34,118,479  | 0.006% |
| 131 | Softrock Minerals Ltd.        | 1,345,588   | 0.000% |
| 132 | Sonoro Energy Ltd.            | 3,038,179   | 0.001% |
| 133 | Source Rock Royalties Ltd.    | 39,509,048  | 0.007% |
| 134 | Southern Energy Corp.         | 69,572,954  | 0.012% |
| 135 | Stamper Oil & Gas Corp.       | 1,913,328   | 0.000% |
| 136 | Strikewell Energy Corp.       | 992,089     | 0.000% |
| 137 | TAG Oil Ltd.                  | 20,545,031  | 0.004% |
| 138 | Tenaz Energy Corp.            | 69,043,945  | 0.012% |
| 139 | Tenth Avenue Petroleum Corp.  | 6,892,100   | 0.001% |
| 140 | Terrace Energy Corp.          | 2,318,534   | 0.000% |
| 141 | Tethys Petroleum Ltd.         | 90,262,159  | 0.016% |
| 142 | Total Helium Ltd.             | 87,376,087  | 0.015% |
| 143 | Tower Resources Ltd.          | 34,428,638  | 0.006% |
| 144 | Trans Canada Gold Corp.       | 1,868,451   | 0.000% |
| 145 | United Hunter Oil & Gas Corp. | 27,783,282  | 0.005% |
| 146 | Vital Energy Inc.             | 33,311,238  | 0.006% |
| 147 | Wescan Energy Corp.           | 10,722,648  | 0.002% |
| 148 | Wilton Resources Inc.         | 34,379,242  | 0.006% |
| 149 | XXL Energy Corp.              | 2,175,883   | 0.000% |

## United Arab Emirates (UAE)

Total Market Capital of Oil & Gas Sector: \$108,029,910,710

| No | Oil and Gas Companies | Market Cap (\$) | Percent |
|----|-----------------------|-----------------|---------|
| 1  | ADNOC                 | 51,375,000,000  | 47.56%  |
| 2  | ADNOC DRILL           | 48,960,000,000  | 45.32%  |
| 3  | Dana Gas              | 7,694,910,710   | 7.12%   |



## Nigeria

Total Market Capital of Oil & Gas Sector: \$995,101,000

| No | Oil and Gas Companies               | Market Capital (\$) | Percent |
|----|-------------------------------------|---------------------|---------|
| 1  | Ardova Plc                          | 18,365,000          | 1.85%   |
| 2  | Capital Oil Plc                     | 1,172,000           | 0.12%   |
| 3  | Caverton Offshore                   | 3,820,000           | 0.38%   |
| 4  | Conoil Plc                          | 23,768,000          | 2.39%   |
| 5  | Eterna Plc                          | 8,829,000           | 0.89%   |
| 6  | Japaul Gold and Ventures            | 2,067,000           | 0.21%   |
| 7  | Mrs Oil Nigeria                     | 4,998,000           | 0.50%   |
| 8  | Oando Plc                           | 70,486,000          | 7.08%   |
| 9  | Rak Unity Petroleum Company         | 17,000,000          | 1.71%   |
| 10 | Seplat Energy                       | 764,978,000         | 76.87%  |
| 11 | TotalEnergies Marketing Nigeria PLC | 79,618,000          | 8.00%   |

## Kuwait

Total Market Capital of Oil & Gas Sector: \$250,429,000

| No | Oil and Gas Companies              | Market Capital (\$) | Percent |
|----|------------------------------------|---------------------|---------|
| 1  | Senergy Holding Company            | 8,800,000           | 3.51%   |
| 2  | Independent Petroleum Group        | 84,783,000          | 33.86%  |
| 3  | National Petroleum Services Copany | 76,900,000          | 30.71%  |
| 4  | The Energy House Holding Company   | 35,775,000          | 14.29%  |
| 5  | Gulf Petroleum Investment Company  | 7,429,000           | 2.97%   |
| 6  | Burgan company for well drilling   | 36,742,000          | 14.67%  |

## Norway

Total Market Capital of Oil & Gas Sector: \$1,434,493,631,000

| No | Oil and Gas Companies | Market Capt (\$)  | Percent |
|----|-----------------------|-------------------|---------|
| 1  | Equinor               | 1,159,900,000,000 | 80.86%  |
| 2  | DNO                   | 16,699,000,000    | 1.16%   |
| 3  | Aker BP ASA           | 141,525,000,000   | 9.87%   |
| 4  | Interoil              | 353,395,000       | 0.02%   |
| 5  | Okea                  | 5,131,000,000     | 0.36%   |
| 6  | Panoro Energy         | 3,662,000,000     | 0.26%   |
| 7  | Petronor E&P          | 1,300,000,000     | 0.09%   |
| 8  | VAR Energy            | 105,598,000,000   | 7.36%   |
| 9  | Petrolia              | 325,236,000       | 0.02%   |

