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Title: THE IMPACT OF OIL PRICE SHOCKS AND MACROECONOMIC FACTORS ON OIL TANKER FIRMS STOCK PERFORMANCE IN THE U.S. STOCK MARKET

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ABSTRACT

The demand for oil transportation service is dependent on the global trade of crude oil and oil tankers transport coil from producer areas to consumer areas. The purpose of this research is to examine the impact of oil price shocks and macroeconomic variables on the stock returns or performance of oil tankers listed on the NYSE stock market between 2010 and 2020 in the United States using a Vector Autoregressive Model. Also, the response of the tanker companies stock performance to oil shocks are investigated using the impulse response analysis. The macroeconomic factors include GDP and Inflation rates for this study. Various worldwide economic events have occurred during the period selected for this research, such as the drastic decline of oil prices from 2014 to 2016, which severely affected the global economy. And also, the coronavirus pandemic that began in late 2019, which damaged the global economy including oil prices. These events determine the perspective as to how the oil price shocks will be analysed. The following hypothesis were developed for testing, the first hypothesis focused on the impact of oil price shocks on oil tanker. Companies listed on the NYSE index. Followed by the second hypothesis, which was on the impact of oil. Price shocks on the tanker market. Third and final hypothesis established concentrated on the effect of macroeconomic factors on oil tanker firms.

The empirical results provide evidence that oil price shocks have an impact on the stock returns on oil tanker companies listed on the NYSE. However, for the second hypothesis testing on oil price shocks and their impact on the tanker market. In this case, the results show a rejection failure of the null hypothesis. In addition, the third hypothesis testing deduced that macroeconomic factors affect the stock performance of oil Tanker companies because there was a lack of null hypothesis rejection and the implication here is that the tanker market has been impacted overall. The empirical results from this study are consistent with the fact that crude oil price shocks and macroeconomic factors affect oil tanker stock returns.

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CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND OF STUDY

Crude oil is a major source of energy powering the global economy as a whole and supplying about 95 percent of energy fuelling the global transport sector (UNCTAD, 2010). Similar to other transport types, shipping transport heavily depends on oil usage. Although, complexities imposed by existing technology and cost have created effective substitutes for crude oil such as biofuels, wind and solar panels. Even though fossil fuel reserves are finite, oil extraction is becoming costly as well as oil production overall, which is predicted to reach its peak level soon (UNCTAD, 2010).

Crude oil is a dominant commodity in the global economy and its pricing has deep social, political and macroeconomic effects on the economy worldwide (Euronav, 2017). The oil tanker sector serves as a fundamental element of the oil market because of the distribution of crude oil through the value chain; from production areas to consumer markets. The shipping sector heavily depends on this energy source, which is becoming scarce and costly to produce. Consequently, this will have some implications on the expenses of the shipping transport services (Euronav, 2017). Oil tankers play a fundamental role within the energy industry value chain. Oil tankers are used for transporting oil from production areas to a refinery, though they can be used for storing oil postproduction. Also, oil tankers are used for carrying oil products like fuel oil, clean oil products that are produced in the refinery are carried on “product” or “clean” tankers, which are smaller in size (Euronav, 2017).

Stopford (2013) breaks down the shipping market into three major sectors; liner shipping sector, specialized shipping sector and bulk shipping sector. The bulk shipping sector is divided into liquid bulk and dry bulk transportation whereby bulk liquids such as crude oil is transported by sea using tankers. This research focuses on the impact of oil prices shocks on the crude tanker sector and stocks of crude tanker companies, therefore the basic definitions and theories behind tanker shipping will be discussed. The world tanker fleet outlines all vessels transporting refined oil products and crude oil products (Stopford, 2013). This comprises of product tankers, chemical parcel tankers, crude oil tankers, liquid gas tankers and gas tankers. In addition, this study will be dealing mainly with crude oil tankers, which is also regarded as oil tankers.

The crude oil tanker is divided into two different types, the product oil vessels transporting

refined oil and the crude oil tanker used for distributing unrefined oil (Bakke & Reinsborg, 2012). The oil tanker is regarded as the largest part of the liquid bulk sector, recording almost 90 percent of the tanker shipping sector in deadweight tons (Stopford, 2013). Furthermore, crude oil tankers distribute an enormous amount of unrefined oil from ports close to oil production areas to refineries, while product tanker, which is classified as a smaller liquid bulk tanker, transports completely refined petroleum products from refiners to ports near consuming areas (Stopford, 2013). In addition, the product tankers stands out as an independent division within the oil tanker division, though they are not identified in statistical terms because of the unclear distinction between product and crude vessels with the fact that product tankers can also be used in rare cases to transport crude oil (Bakke & Reinsborg, 2012).

Vessels used for liquid bulk trades are classified into different size types called Deadweight ton (DWT). Oil tankers come in different sizes, the largest standard size is the VLCC (Very Large Carrier), which is categorized as the largest vessel with an average of 300,000 DWT to a maximum of 550,000 DWT transporting almost 2 million barrels of oil per shipment, these vessels transport crude oil through western Europe, Arabian Gulf and United States routes. The Suezmax vessel transport half the amount of the VLCC tanker and it ranges from 120,000 to 200,000 DWT, which sails through the Suez canal, the west Africa Region and the North Sea Region (Stopford, 2013). Furthermore, the Aframax tanker follows next with a size ranging from 80,000 to 120,000 dwt transporting 600,000 barrels of oil, they are used in the basin of the Caribbean Sea, North Sea, Black Sea Mediterranean and china sea. And finally, the Panamax and Handysize vessel size range from 80,000 dwt to 10,000 dwt, typically these tankers function in medium or inter coastal short haul crude oil trades, in regions of low oil production. The Panamax tankers are most used as product tankers carrying refined petrochemical products (Stopford, 2013).

The construction of oil tankers takes about 9 to 15 months from the time the keel is first laid, meaning that it will take almost two years from the time of the newbuilding agreement ordering until the tanker is delivered because many vital parts are long-lead objects that needs to be produced and ordered prior to the construction of the ship (Euronav, 2016). With various sizes of vessels, there is a low number of sites capable of constructing them and these areas are located in Asia, to be specific China, Japan and South Korea (Euronav, 2016). There are certain factors that influence the price of contracting a tanker newbuilding which are, steel, price of energy, construction finance and labour costs. The expected economic lifespan of a crude tanker historically has been 25 years, though in recent years this has fallen to 20 years

(Stopford, 2013).

Oil tanker shipping is a business to business activity with numerous customers who consider shipping as a vital part of their transportation value chain (Euronav, 2017). These customers are, International Oil Companies, National Oil Companies along with trading organizations such as Glencore. These oil companies usually require vessels to transport crude oil or deliver to or from third party refineries to their customers. Furthermore, the trading firms are more opportunistic in terms of trading oil, hence it is unpredictable in terms of where and when they need an oil tanker (Euronav, 2017). The customer is frequently regarded as the "Charterer" of the ship. In addition, when a customer wants to charter an oil tanker, they get in touch with a ship broker, who contacts the ship owners (Oil Tanker companies) and they act as an intermediary in negotiating the price for transporting crude oil.

The shipping industry is popularly known to be a volatile sector and understanding this fluctuation is fundamental for participants of this sector in developing investment and operating decisions (Bakke & Reinsborg, 2012). This research lays down its focus on the oil tanker market that can be challenging because it can be influenced by declining demand in global transportation for petroleum products and a convincing fleet growth especially from OCED nations with an unstable macroeconomic environment. And due to this instability and poor world economy there has been a decrease in period charter earnings and spot prices causing a decline in ship values for the last years (Bakke & Reinsborg, 2012). The shipping sector as a whole, specifically the tanker sector within the industry is heavily exposed to volatility caused by macroeconomic factors. For example, in 2007 38% of the world shipping fleet consisted of tanker fleet transporting crude oil and other petroleum products (Haakon, et al., 2011). An increase in crude oil prices serves as an indicator for economic growth in the maritime sector, but this effect also occurs in both the operating cost and revenue for crude tankers.

1.2 PROBLEM STATEMENT

The drastic decrease in crude oil prices in 2014 severely affected stock markets worldwide, whereby crude oil prices dropped from approximately $120 per barrel to $30 dollars per barrel at the end of 2015. The quick decline in oil prices led to an immense correction throughout every stock market worldwide. Although, companies and market are recovering and attempting to adapt with the new reality, the question has been raised on how affected sectors are due to change in crude oil prices remains unanswered. Various research work conducted have

attempted to develop an answer. Firstly, Sadorsky (2001) claimed there was a significant positive relationship amongst the Canadian oil and gas stock market and crude oil prices in which a 1 percent change in crude oil price led to a change of 0.305 percent in the value of the stock market. For investors and financial institutions, understanding the risks involved with this sector is fundamental for those directly involved daily.

Furthermore, the positive emerging growth of India and China's economy has become progressively significant for oil prices. Basher & Sadorsky (2006) concluded that a strong evidence of crude oil price volatility affected stock market returns in almost 21 evolving markets. Cong, et al. (2008) argued that there was no statistically important connection between the Chinese stock market and oil price shocks. Nonetheless, Poulakidas & Joutz (2009) conducted a research on the effect of crude oil price volatility and tanker market, the analysis claimed that a rise in demand for crude oil causes an increase in tanker rates. Finally, Grammenous & Marcoulis (1996) analysed 19 different shipping companies from 1989 to 1993 discovering that shipping returns turned out to be negatively related to changes in crude oil prices.

From the various research above, some evident observations are made. Firstly, there is an enormous amount of research on the topic of oil price volatility and its impact on stock markets, individual stocks and industries. Though, this is of no surprise because crude oil is the most traded product globally and thus several research can be attributed to its development. Since the findings from different researchers vary, the conclusion between these studies seem to be divided. In addition, there appears to be a lack of research on different sectors in the shipping industry before studying the impact of oil price volatility, which prompts this research to be conducted. Furthermore, the shipping sector involved in this study is the Oil tanker market, which is directly involved in transporting unrefined crude oil products or maintains a supporting role in the shipping value chain. Since, there is a lack of sufficient literature for the impact of crude oil price shocks on different shipping sectors, it is significant to investigate if this sector and companies in the industry are influenced or affected by sudden rise and decline in crude oil prices.

1.3 STUDY RATIONALE

It is clearly stated in the problem statement of this research that previous studies have analysed the impact of oil price change across various industries, this research will analyse the impact

of oil price shocks on the oil tanker market and stock performance of various oil tanker companies on the New York Stock Exchange index to pinpoint the effect of such shocks for this industry specifically. In addition, this research will be beneficial in complementing additional knowledge to existing academic literature through analysing the impact of such events (oil price shocks) on the Oil Tanker Shipping industry.

Furthermore, the motivation of this study stems from my career aspirations of working in the Tanker shipping industry in Nigeria. Accordingly, detailed and in-depth knowledge of this sector especially the crude tanker segment will serve as a major contribution to my chances of success in my chosen career path.

1.4 RESEARCH AIMS AND OBJECTIVES

The aim of this study is to contribute to the developing knowledge of research related to this study by investigating the impact of oil price shocks on a selected oil tanker companies listed on the NYSE index along with the impact of oil price shocks on the oil tanker sector. Therefore, the following research objectives have been developed for this research are to determine the impact of Oil price shocks on stock market performance of publicly listed oil tanker companies from 2010 to 2020. To identify the stock index in the US needed for the selection of the Oil tanker companies. To identify the amount publicly listed oil tanker companies to be used as case studies. And to examine the impact of oil price shocks on all the oil tanker companies used as a case study.

1.5 RESEARCH QUESTIONS

The research question for this study will act as the core throughout the research and further guide the direction of the analysis. The analysis will evaluate the impact of crude oil price shocks on the crude tanker sector and share prices of listed companies. Therefore, the research question must be measurable, relevant and specific because the major goal of this research is to present an unambiguous answer to the questions raised. Hence, according to the aims and objectives mentioned, this study investigates the following research questions stated as follows.

1. Did Oil Price shocks disrupt the stock market performance of Oil tanker firms listed on the NYSE between the period 2010 to 2020?

2. What is the impact of Oil price shocks on the Tanker Market?

3. Do Macroeconomic factors have an impact on the stock performance of oil tanker firms?

From the research questions formulated, here are the alternate and null hypothesis for this research to be analysed and interpreted.

H0: Oil prices Shocks disrupt the stock performance of Oil Tanker firms listed on the NYSE index.

H1: Oil prices Shocks do not disrupt the stock performance of Oil Tanker firms listed on the NYSE index.

H0: Oil price shocks have an impact on the Tanker Market.

H1: Oil price shocks do not have an impact on the Tanker Market.

H0: Macroeconomic factors have an impact on the stock performance of oil tanker firms.

H1: Macroeconomic factors do not have an impact on the stock performance of oil tanker firms.

1.6 RESEARCH STRUCTURE

This research is structured into four further chapters, organized as follow. The literature review presents a detailed description of the concepts and empirical findings from past studies related to this study, such as reviews on oil tankers, oil price shocks and stock markets. A theoretical framework is used in this chapter critically review the research design, interpretation of data and the result of the analysis from past studies for further improvement While, the data and methodology section deals with how the research was designed, the research philosophy implemented for this research, how data was collected from reliable database sources, the statistical model for analysing the data, the limitations of the research design and ethical considerations. The fourth chapter which is the data analysis chapters critically assesses the findings from the interpreted data in relation to the proven theoretical framework, critiques what was found from the data analysis and gives insight on the research hypothesis and the data. Finally, the conclusion and recommendation section summaries the study by giving insights on total knowledge gained from the research and answers the research questions along with recommendations for future research.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter, the conceptual, empirical and theoretical review of the impact of oil price shocks on the crude tanker market and share price performance of crude tanker companies will be discussed to deliver and criticise knowledge that has been reported by past researchers covering this field of study. The topic investigating the volatility of commodity prices and their impacts on stock markets has been debated throughout the financial theory. Although, stocks and commodities are traded on various exchanges, there is a significant dependence between the two. This research as chosen to look at the reactions of crude tanker share prices towards the impact of oil prices shocks or volatility. This will be explained further and elaborated below using widespread of authentic academic sources such as journals, dissertations and articles on the topic of oil prices and closing equity prices.

2.2 RELATIONSHIP BETWEEN CRUDE OIL PRICES AND TANKER MARKET

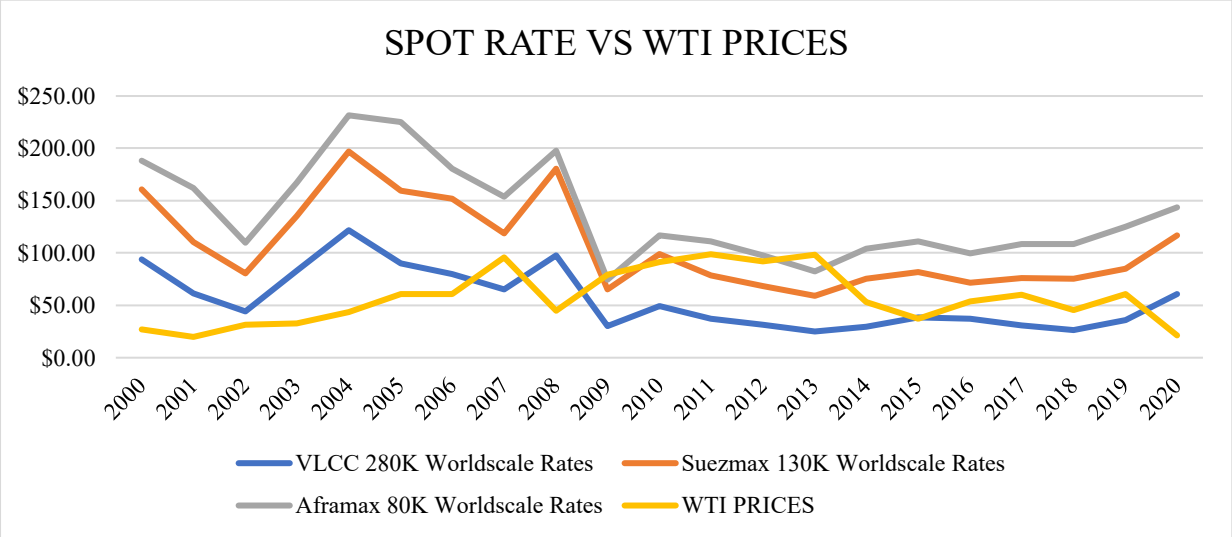
There is a long history with various literature from different researchers on the discussion of the factors that determine the association between crude oil prices and tanker rates. The pursuit in search of understanding oil tanker price movements has become fundamental since the rapid rise of oil tanker freight prices. (Poten & Partners , 2004) were recognized ship brokers who claimed that VLCC freight prices were at the peak they have been in over 10 years. Furthermore, crude tanker rates, which averaged lower than 40 World scale (WS) rates in 2002 and 50 WS rates in 2003, reached its highest average in mid-100 WS rates in 2004. The factors which caused the drastic rise on the VLCC, Suezmax and Aframax tanker rates was the increase in oil demand by developing economies such as China and India according to (Poten & Partners , 2005). Kavussanos (2001) developed a theoretical framework for identifying the conditional means of time charter rates and freight rates, elucidating that fluctuations increases during periods of large external volatility to the industry, for example 1980 to 1981 oil crises, 1973 to 1974 oil crises and the Iraq invasion in Kuwait that took place in 1990.

In addition, Kavussanos (2001) research work found a significant association between size and coefficient of variations in a way that freight prices for large oil tankers have higher variations than smaller oil tankers, which indicates that there is elasticity with the size of oil tankers. Similarly, these findings are consistent with the empirical studies of (Alizadeh, 2013) who researched on the connection between the level of oil prices in the United States of America to freight rates. Alizadeh and Nomikos (2004) discovered evidence of an existing long-term

association between oil prices in USA and freight rates. Although, no evidence was found that physical crude and Western Texas Intermediate (WTI) future price differentials were related to freight rates. Finally, an increase was detected in demand for imported such as, Bonny and Brent, which lead to a rise in demand for shipping transportation serving as a beneficial effect on the level of freight rates.

Poulakidas and Joutz (2009) denotes that shipping transportation cost is a major component added to the cost of crude oil, making the prediction very fundamental for forecasting. Also, their research claims that the variation of oil tanker rates is associated with crude oil prices and 40 percent is due to other factors. These other factors involved in the impact of oil prices and tankers rates over recent years are the Strength of the US economy, unstable government in Venezuela, production cuts by Russia caused by legal issues, supply disruptions in Nigeria, turbulent climate change including interruptions of Gulf Port facilities by reoccurring hurricanes such as Hurricanes, Charles, Katrina, Ivan and Frances, the drop in Iraqi oil production due to conflicts according to (Poulakidas & Joutz, 2009).

Figure 1: 20 YEARS SPOT RATES TREND WITH WTI PRICES



Source: Clarkson Research (Shipping Intelligence Network) and Reuter Eikon (2020)

This graph features a 20 years of spot rate prices from different oil tankers such as VLCC, Aframax and Suezmax tankers with different benchmark rates (World scale Rates). These rates are set with Western Texas Intermediate prices showing their relationship over 20 years and it can be observed in 2008 during the Global Financial crisis and Economic Recession that there was a drastic decrease in oil prices from $95 per barrel to almost $40 per barrel. On the other hand, an opposite effect was identified for all oil tanker spot rates in 2008, which was an

increase, and this is considered to be a significant effect for crude tanker companies. Though, from 2009 the oil price recovered but that was the opposite for tanker rates, which declined rapidly. Therefore, this research proposes to study the how oil price volatility affect the stock performance of oil tanker firms, the impact of oil price shocks on the tanker market and how macroeconomic factors affect oil tanker companies.

2.3 EMPIRICAL REVIEW: PREVIOUS STUDIES

The elaboration of crude oil prices is a popular field of study worldwide, whereby various researchers have analysed the impact it has had on share prices within specific industries. To begin the review of past studies, this section commences with historical research work related to this study. Manning, (1991) investigates the relationship among different variations of share prices and oil prices of crude oil organizations. As part of the hypothesis, the research aimed to analyse various reactions in the market prices of three different categories of portfolios of crude oil firms to oil prices. Therefore, arguing that the influence of crude oil price news is higher for the exploration and production portfolio than the portfolio involving fully integrated oil companies. From the result of testing the first hypothesis, a correlation was found in lagged impact of crude oil prices changes and weekly portfolio returns, which the research claims are signs of market incompetence. Nonetheless, the research findings showed an existing impact resulting from unexpected oil price fluctuation in the returns of the three oil stock portfolios category over the period of 1986 to 1988.

Huang, et al., (1996) examines the connection between daily oil futures returns on daily U.S. stock returns. The research finding presented suggested that crude oil futures returns lead to some individual oil firms equity returns. Also, the research discovered that crude oil future returns do have enough effect on broad-based market indices. Likewise, (Ciner, 2012) examines how crude oil price volatility affects equity price movements when accounting for the time variation. This study focuses on how insistent the volatility is and the extent to which the persistence influences the shares. With the application of monthly data of S&P 500, WTI (West Texas Intermediate) oil price benchmark and 20 top firms from DIJA, the study discovered that crude oil price fluctuations with persistency of less than 12 was negatively connected to equity returns, which was not applicable for oil shares that had a positive reaction to the change. In addition, the research also claimed that shocks persisting within 12 to 36 months had a positive effect in the equity market and shocks longer than 36 months were negative. The review later progresses to recent studies as follows.

Lin, et al., (2011) scrutinized the connection between economic activity and oil price fluctuation in greater China. The research used monthly data of alterations in real import oil price and crude oil production with real equity index returns and real activity data described by representative single voyage freight prices used to quantify oil demand worldwide. The research findings stated that most supply shocks have a fundamental positive effect on the Chinese and Hong Kong equity markets, also the impact of oil price volatility in China have been mixed. The global demand fluctuations for crude oil in Taiwan and Hong Kong were considerably moved in a positive way and china was unaffected. Also, the period of the research was impacted by the rise in Chinese economic growth, which may have offset any rise in crude oil price.

Crude oil has been discussed in relation to the transportation industry including shipping transportation, aviation, railroad and so on. Evidence from various research study have shown conflicting outcomes, focusing on the development of crude oil prices overtime and studying oil price volatility. Gogieni, (2010) stated that the transportation industry reacts positively (negatively) to a decrease (increase) in crude oil prices. Drobetz, et al., (2010) studies the development of 48 oil tankers, and container sector in 48 different countries from 1999 to 2007. From their analysis, only a single statistically significant relationship was found between container rates and development of oil prices. The research goes on to suggest that the relationship can be explained by putting a rise in oil prices into consideration as a substitution for improved economic activity, which arguably impacts the transportation industry in a progressive way. Although the findings of the research were statistically significant, the study was conducted in a rather bullish sector, which should be put into consideration.

Furthermore, co-integration was found between spot oil prices and crude oil tanker rates suggesting they could be described by the demand for tanker working as the derivative of the demand for crude oil. Lastly, a research on the exposure of shipping organization on various macroeconomic factors such as, interest rates, crude oil prices and exchange rates using the return of 143 firms in 16 countries within the period of 1997 and 2005 was conducted by , (El-Masry, et al., 2010). This study argues that shipping companies in general are more exposed to exchange rate volatility than interest rates and they also argue that shipping firms are able to supress and manage the impact of these risk factors impact on their equity return. The research also observed that a high number of shipping firms gained from the appreciation of the dollar along with the rise in crude oil prices. The positive association between crude oil prices and shipping firms is derived from a rise in the price of commodities such as crude oil, which serves

as an indicator for the state of the global economy.

It will be worth reviewing studies concentrating on macroeconomic factors as it is a major part of the research linked with the hypothesis developed. Yu et al. (2019) suggests diversification for the tanker companies to avoid maritime structure changes caused by macroeconomic factors; this is especially important to deal with the resulting supply shocks that may happen in oil due to the macroeconomic variables.

Thus, the impact in terms of its magnitude as well as its direction is not fully clear. In the macroeconomic factors, there are multiple aspects to consider such as inflation, consumption rate of consumers, GDP, and more; ergo, the intuition here is that price changes entailing GDP as well as the inflation will have the biggest impact. As discussed by Yu et al. (2019) the price shocks have the biggest impact by which the structure changes which is aligned with the results of the hypothesis testing. According to Molvik and Stafseng (2018), the tanker sector is a major aspect of the shipping market on an international level; however, there is a high level of volatility as well as risk here. As mentioned by Molvik and Stafseng (2018), there are short-term forecasting and long-term forecasting; in terms of short-term, the forecasting is based on trying to deal with the disruptive aspect of rates; this is done considering general determinants as well as route specific considerations.

Molvik and Stafseng (2018) discuss how there is grouping of factors into demand and supply; the grouping also considers economic as well as non-economic factors. The macroeconomic variables also have a tendency to impact specific routes above all else; due to this, there is a need to have a focus on dealing with the specific routes and the factors which impact it overall. Thus, when there is a reduction in price, then the forecasted orders are no longer there which entails certain routes. When there is a change in the price of oil, then the cargo will expand or contract accordingly. Therefore, with the cost of oil reducing, then there is the large hauler sector by which companies that transport are focused on profits; this is done to support their incomes. For delivery companies, buying more vehicles and upgrading the existing vehicles helps with overall income and increased activity. According to Ha and Seo (2017), the tanker industry has multiple activities by which they try to manage the existing difficult landscape. One of the core activities here is to try and acquire economies of scale. Economies of scale is developing processes by which costs are reduced while sustaining high quality for competitive operations. One activity is to increase the size of chips as discussed; however, Ha and Seo (2017) mention other actions such as merging with other tanker companies. However, merging

with tanker companies only has benefit to the large companies that engage in it; it doesn't help the tanker sector as a whole. For instance, the smaller companies won't be able to merge and will be dealing with tougher competition; this will continue to make the tanker market difficult to manage. With the merging of the tanker companies, the routes also change which make forecasting yet difficult here. Regardless, the higher income is a means to acquire the means to develop the infrastructure and recycle any existing assets. Ergo, the sales and purchase activities of the tanker sector is significant as they engage in such activities.

Typically, organizations focus on situations by which the most impact is made; this entails using the existing situation and then adjusting accordingly. With having expenses which are low for bunkers and rates of cargo being high, Euronav acquired VLCCs has caused it to acquire benefits unlike before at new levels. Euronav has also seen benefits by empowering the primary VLCC administrators from being unbelievable to eventually more realistic. For Maersk Tankers, the focus is on sustainability; they are promoting their image of a clean company especially in dealing with oils which are messy. Overtime, the primary choices here within the market will be the main established system in the future. There have been multiple administrators such as Shell, Frontline, and Teekay that have managed to merge their positions as well as cutting out their specialty for higher levels of business. With the drop of prices, there is the expectation that storage will increase. In this case, multiple traders focus on the chartering of tanker vessels for their long-term plans; this is done in case there is an increase of price in the future by which profits will increase with the purchasing of the oil at a lower price. This refers to a sort of arbitrage of sorts.

However, Ederington et al. (2017) mentions that this arbitrage has multiple implications which include financial and storage; the tankers need to then focus on the limits here as well which include storage and finances to maintain the operations. As a result, it is a risk in trying to hold out for the future in hopes of profits. In addition, (El-Masry, et al., 2010) conceded that breaking down the shipping sector into different segments may shed more light on their sector specific exposure and improve the empirical results. (Shi, et al., 2013) categorized oil price shocks into non-supply and supply shocks. The research investigates the different oil shocks to oil tanker rates using Structural Vector Autoregressive (SVAR) model and impulse response analysis. They discovered that influence of oil fluctuations by supply of crude oil factors on freight markers is fundamental, while the response of oil tanker freights rates to non-supply shocks are limited and different for the long run and short term. Alizadeh & Nomikos, (2004) researched on the arbitrage and causality between tanker freight markets and oil futures. The

researchers considered physical crude oil, WTI futures, and oil tanker freight rates draw empirical results from the basic cost-of-carry model discovering evidence in favour of the presence of long-term associated between oil prices and freight rates in the US.

Poulakidas & Joutz, (2009) study the impact of crude oil prices changes on tanker rates from between 1998 and 2006 using the Vector Autoregressive model (VAR). This research involved weekly WTI oil spot prices, BDTI (Baltic Dirty Tanker Index) and U.S.A oil inventories. This research revealed Granger causality in the spot rates when using past knowledge of tanker spot rates and future contracts of the crude oil inventories and WTI. The outcomes of (Poulakidas & Joutz, 2009) study proposed that when the price of 3-months futures contract of oil is traded above the spot price, there is higher pressure on tanker spot rates. The research conducted by (Drobetz, et al., 2010) is congruent with this hypothesis of this study because their research explains how shipping company stock returns are the reason why crude oil is; ani, a major factor for carriage and the constant demand for oil tankers is originated from the demand for oil. According to El-Masry, et al., (2010), the demand for tanker transport originates from increasing oil prices, therefore (Drobetz, et al., 2010) study denotes that the effect of oil prices on shipping returns could have a negative or positive outcome. It is evident that the findings of their study may have been manipulated by the "apparent" increase in oil prices during the time of their study.

Also, from the other empirical studies mentioned above associated with the impact of oil prices on stock returns, it seems that there is a positive and significant relationship that is identified from these studies. There are other notable empirical studies that had these results, (Sadorsky, P., 2001) determined that crude oil prices have a positive impact on the stock returns of Canadian oil and gas sector, this findings correspond with (Manning , 1991) result, which found out that crude oil price have a positive impact on the stock returns of UK oil companies. Similarly, other studies like (Boyer & Filion, 2007) argued that the performance of the Canadian energy stocks are beneficially linked to the appreciation of crude oil price. In addition, (Faff & Marshall, 2005) discovered that crude oil has a significant effect on the Australian Oil and gas industry stock returns. In contrast, Grammenos & Arkoulis , (2002) learnt that international shipping returns have a negative effect from oil prices, although their findings advocated that shipping returns benefit from a decline of the U.S dollars.

In conclusion, in this research oil prices are also seen as an expense for oil tanker firms as it is considered as an outflow even though oil tanker business is revenue related. Since oil prices

are seen as an outflow, an increase in the prices of oil may have a negative effect on the stock returns of these tanker companies. From previous discussion in the first chapter and the discussion above, this research will be testing the following hypothesis:

Hypothesis 1: Oil prices Shocks disrupt the stock performance of Oil Tanker firms listed on the NYSE index.

Hypothesis 2: Oil price shocks have an impact on the Tanker Market.

Hypothesis 3: Macroeconomic factors have an impact on the stock performance of oil tanker firms.

Consequently, this study focuses on the impact of oil prices on tanker companies along with apply macroeconomic factors such as inflation and Gross Domestic Product (GDP). This research contributes to the literature in two fundamental ways. Firstly, the research presents the simultaneous relationship between crude oil prices and share price of tanker firms with the help of VAR model, which is absent in most of the existing literature discussed. Also, the findings from this research will be significant to oil tanker companies, oil companies and investors in the tanker market. For instance, crude tanker firms will be able to make better decisions following various oil price shocks, which can help in making decision to rent vessels, sell vessels in the second-hand market and build vessels when crude oil price shocks occur. In addition, the empirical results of this research will be useful for tanker companies to have a better understanding of the relationship between the crude oil tanker market and the crude oil markers in the long and short run. The main gap of knowledge this research is filling is what happens in the Tanker Market when there's a fluctuation in oil prices considering that crude oil is the main product that drives this industry.

To sum up the literature review chapter, this research will attempt to propose a framework on the variables needed for the analysis of the research questions proposed which is, the analysis on the impact of oil price shocks on the Oil Tanker Market and the stock performance of selected oil tanker companies on the New York Stock Exchange Index. For the analysis, this research desires to contribute to the existing literature by advancing the understanding of the Oil Tanker industry within the shipping sector by analysis the data using descriptive statistics, Unit Root tests, correlation matrix and Vector Autoregressive model (VAR).

CHAPTER THREE: DATA & METHODOLOGY

3.1 INTRODUCTION

This current section reviews the research method strategy in terms of Research philosophy, research design, data collection, data reliability, research limitation and ethical considerations. The purpose of this chapter is to cover the research methods and statistical model needed to fulfil the aims and objectives. The research philosophy deals with nature source and developing the knowledge of the study and the techniques by which data about the study should be used, analysed and collected. The following chapters support and justify the collection of data and how they will be analysed statistically. In conclusion, the research limitation summarises how the methodology proposed for this study are examined based on reliability and validity.

3.2 RESEARCH PHILOSOPHY

Thomas Kuhn (1962) originally used the term "Paradigm" as a philosophical way of reasoning. From the educational research perspective, the word paradigm is described as a researcher's "worldview" (Mackenzie & Knipe , 2006). The worldview is seen as a school of thought, or shared belief or perspective that illustrates the interpretation or meaning of research data. According to Lather , (1986), a research paradigm shows the researchers beliefs about the world. In addition, research paradigm is defined as a conceptual lens by which the researcher scrutinizes the methodological aspect of their research project to prove the research methods that will be used, and data will be analysed. Finally, the paradigm expresses a researcher's philosophical background, which has a fundamental implication for every decision made in the process of the research work, including the choice of methods and methodology. Various paradigms have been proposed by researchers but (Candy, 1989) grouped these paradigms into classifications, namely, Interpretivist and Positivist paradigms.

This research adopts the positivist paradigm. This was first proposed by Comte, (1856), the positivist paradigm is summarised as a worldview to research, which is also regarded in research methods as the scientific method of investigation. The positivist approach is chosen as the preferred worldview for research, which explains observations in terms of measurable entities and facts (Fadhel, 2002). Research work using the positivist approach rely on formulation of hypothesis, deductive logic, testing those hypothesis, mathematical calculation, equations, expressions, extrapolations and offering operational definitions to derive

conclusions. This proposed paradigm is present in this research aims and objectives, which study's the association between oil prices and oil tanker companies stock performance on the NYSE index in the United states. In conclusion, the positivist paradigm supports the use of quantitative data as the foundation for the researcher's capability to be detailed in the explanations of the coefficient and parameters in the data tested, gathered and interpreted, so as to acknowledge the relationships embedded in the data examined.

3.3 ETHICAL CONSIDERATION

The ethical consideration is one of the most important parts of a research. Bryman & Bell, (2007) list ten principles associated to ethical considerations in this study, only some principles apply to this research. Firstly, this study acknowledges the works of various researchers that have been used as a reference in every chapter of this study with the use of Harvard referencing system following the rules from the dissertation handbook. This study also adheres to the university's code of Ethical Practice in every aspect of the study. While abiding to the university's code of ethical practice, the author was concerned about composing an authentic study by avoiding plagiarism through understating and referencing the right academic journals, articles and books. This research maintains the highest level of objectivity in analyses and discussions throughout the study.

3.4 DATA COLLECTION METHODS

The analysis and collection of data is fundamental part of this study as the estimated and statistical calculations are originated on the basis of obtained data. The research design shows the overall design varying from data collection methods to techniques for data analysis and the type of data used to carry out the research. Data is a fundamental part of this study to conduct the analysis. Secondary data will be used for this study.

From the research paradigm selected, this study uses quantitative data over a short period of time. The quantitative research is a structured and experimental based approach that measures and solves the problem through numerical data by using statistical methodology. This type of approach will be insightful in drawing a definite conclusion for this study. Thus, this research examines the impact of oil price shocks on stock performance of oil tanker companies on the NYSE index, this research will employ weekly data from 2010 to 2020 from the following variables, namely; United States weekly crude oil production, weekly Wester Texas Intermediate (WTI) prices, closing stock price of four selected oil tanker companies on the

NYSE index and the NYSE stock index closing price weekly from 2010 to 2020. Also, annual data from 2010 to 2020 obtained from U.S. Federal Reserve Economic data (FRED) for U.S. inflation rate, while quarterly data from the same period was obtained for U.S. GDP (Gross. Domestic Product), which will be used for the analysis; the use of annual and quarterly frequency will be discussed in the research limitation. In addition, the use of weekly, annual and quarterly data sparked an adjustment for the annual and quarterly data, which was converted to weekly data using EViews (Polynomial Interpolation), after the conversion was done the dataset had 522 observations.

The reason why variables such as Oil production, Inflation and GDP have been used selected for the data analysis is because this research focuses on the NYSE index which is located in United States of America and these variables have an influence on Oil tankers, have an effect on the stock performance of these companies and the stock index. The data for US weekly oil production was collected from Energy Information Administration (EIA), while WTI prices were collected from Thomson Reuters DataStream.

The research hypothesis and question will guide the criteria for the data selection. As the main focus of this study is to analyse the impact of oil price shocks on the stock performance Oil tanker companies listed on the New York Stock Exchange (NYSE). After strict considerations, the study's determined dataset is based on the following selection for process for the Oil tanker companies that are going to be used as a case study. Here's a list of the selection.

1. The Oil tanker companies selected must be on the publicly listed owners list on Clarkson's database (only four companies are selected for this study).
2. The Oil tanker companies must be listed on the New York Stock Exchange (NYSE).
3. The Oil tanker companies have to be listed during the estimation period.
4. All data for the Oil tanker companies and stock index must be obtained on Thomson Reuters DataStream.
5. The market capitalization of these companies must be, on average, 500 million dollars.
6. The oil price shock must be associated to a change in WTI crude oil spot prices.
7. The period of the oil price shock has to be between 2010 to 2020.
8. The oil tanker companies must have a minimum fleet number of 10.

The four Oil tanker companies that have been selected for this study are, Euronav NV, DHT Holding, Frontline Limited, and Teekay Tankers. For the Oil tanker companies and stock index data selected, all significant data have been extracted from Thomson Reuters DataStream. This is because it is one of the most comprehensive financial and economic time series databases, which serves as a reliable source for data extraction. Also, the WTI benchmark prices have been obtained from the same database. As most of the data are obtained from the same database, this study argues that by obtaining the data from one source, there is a reduced risk of invalid data, which may arise when extracting the data from multiple sources and analysing or testing the data. This research applies WTI spot prices instead of future prices because majority of the literature apply spot prices in their research. Also, it is evident in recent research that stock prices react to changes in crude oil spot prices.

The time frame for the analysis is set at a period of 2010 to 2020. Initially, this research wished to use a longer time frame. However, since the companies are required to be publicly listed, majority of the companies within the oil tanker industry were not publicly listed before the beginning of the desired research period. Therefore, the chosen period of approximately 10 years will provide sufficient data and will also cover oil shocks during this period.

3.5 DATA RELIABILITY

In terms of data reliability, this deals with how consistent this research will be overtime. Data reliability refers to the relevance that will be derived from this research to future researchers who want to use it as a reference for empirical findings. For validity of this research, the process of analysis the data was established based on what past researchers developed from their study, the effort of the past research has contributed to high reliability and validity for this research to be conducted. Hence, this will be significant when concluding on the impact oil price shocks on the stock performance of Oil tanker companies based on using other macroeconomic factors. If there's a lack of reliability and validity, the results of this study will be insignificant.

3.6 DATA ANALYSIS

From the data collected and modified for this section, the following statistical methods are proposed to study the effects of oil price shocks on stock performance of Oil Tanker Companies along with macroeconomic factors on the New York Stock Exchange. Firstly, descriptive

statistics will be employed in analysing the data by outlining the coefficients from the data set in order to summarise the data. The descriptive statistics will also provide a variety of different results on the overall impact of the selected macroeconomic variables and WTI price used in this study. After analysing and interpreting the descriptive statistics, the correlation matrix will be applied to summarise the data providing a structure to prove if it is possible to identify variables that are possibly correlated. The correlation matrix is fundamental for forecasting through the use of analysing existing trends, thus there is an idea of what is currently occurring using existing trends to predict what may occur in the future. Therefore, this makes the correlation analysis very effective.

The unit root test comes next for this study, the unit root test is used for time series data to check if there is stationarity or non-stationarity in the time series analysed, and this will be significant in understanding the impact of oil price shocks on the stock performance of Oil tanker companies on the NYSE. The Augmented Dickey-Fuller (ADF) test is categorized as part of the unit root test which deals with large time series sample, and this will be suitable for the data collected. Augmented Dickey-Fuller test is important for statistical significance testing, meaning the test involves hypothesis testing of the alternate and null hypothesis to derive a test statistic result reporting the p-values of the variables. From the test statistics, an interference will be made as to whether the variables tested are stationary or non-stationary.

In addition, Augmented Dickey-Fuller tests is conducted through three versions, with an intercept, without and intercept and with both, this is done to identify variables in the dataset with a deterministic trend. Variables with a trend as not similar to non-stationary series or integrated series. Also, the Kwiatkowski Phillips Schmidt approach is an aspect of the unit root test supporting the ADF test by confirming results. This test undertakes stationarity normally, which is not likely to have a non-stationary conclusion in some cases and the KPSS test is conducted in versions; with and without a linear trend. In conclusion, this approach involves scrutinizing the time series properties of the data series, which deals with looking at trends and patterns in the data and test for stationarity and order of integration (Poulakidas & Joutz, 2009). The ADF test uses this equation for testing the stationarity of series from the three versions mentioned:

Table 1: UNIT ROOT VERSIONS

Version 0	No constant, No trend	$\Delta y_t = \beta_i y_{t-1} + \sum_{i=1}^{P} \gamma_i \Delta y_{t-i} + \vartheta_t$
Version 1	Constant only	$\Delta y_t = \beta_0 + \beta_i y_{t-1} + \sum_{i=1}^{P} \gamma_i \Delta y_{t-i} + \vartheta_t$
Version 2	Constant and Trend	$\Delta y_t = \beta_0 + \beta_i y_{t-1} + \beta_2 i + \sum_{i=1}^{P} \gamma_i \Delta y_{t-i} + \vartheta_t$

Where the null hypothesis of the ADF test is $\beta = 0$ and $\beta > 0$ is equivalent to the alternate hypothesis. If $\beta = 0$ is the final result, it is called a unit root meaning the time series is not stationary. The ϑ_t is assumed to be a Gaussian white noise random error and $i = 1$ is the number of observations in the sample, which is a term for trend (Poulakidas & Joutz, 2009).

Finally, the Vector Autoregressive model (VAR) is the statistical model that will be used for testing the hypothesis developed for this study. The VAR model is important for describing the dynamic behaviour of financial and economic time series and it is one of the most flexible models for analysing multivariate time series. The VAR model will be estimated for the whole-time frame covering the oil price shocks that impacted the stock performance of the oil tanker companies on the NYSE selected. This step comprises of testing for a suitable lag length of the study, including tests for system/model stability and residual diagnostic test. The VAR model is represented as this equation below.

$$y_t = c + D_1 y_{t-1} + D_2 y_{t-2} + \cdots + D_p y_{t-p} + e_t$$

Where A_i represents the 4 X 4 coefficient matrix of coefficients at the ith lag, c is the 4 X 1 intercept vector, y_t is the 4 X 1 endogenous vector and e_t is the error terms, which is assumed to be white noise and can be contemporaneously correlated. The variables for this study are represented in this equation as follows. U.S. GDP comes into this equation first followed by the U.S. oil production variable. The oil price variable enters third in the VAR equation because

this study's research hypothesis revolves around the effect of oil prices on oil tanker company stock returns on the NYSE index, which is the last variable in the VAR equation. The VAR model is often criticized for assuming the linear interdependencies of markets (Kevin, et al., 2018).

The methodology explained and selected for this study are very reliable with the research paradigm along with methodology from past studies reviewed in the literature review. The main methodology in this study include, descriptive statistics, correlation matrix, Unit Root test and VAR, which are necessary to answer the research question and test the hypothesis developed. To study the impact of oil price shocks, the variables used outline the health of the US economy. The correlation matrix and unit root test will help in understanding how a change in. one variable can affect the other variables and the relationships of these variables. The descriptive statistics will serve as an overtime analysis for the data set. The impact of oil price shocks on oil tanker companies is expected to be a complex analysis, therefore this is why there is a need to use multiple methods and models. As a result, the aims and objectives with the research questions will be answered and achieved as the models will provide results for developing the findings that will be interpreted.

3.7 RESEARCH LIMITATIONS

The study's uses a small amount of oil tanker companies as a case study, which is a limitation. In comparison to the past studies examined in the literature review providing evidence of the use of a larger sample size for companies used for their research, which proved to be relevant and fundamental in analysing the impact of oil price shocks on companies. Although, the use of a few companies for the case study allows for little complications and errors in the data analyses. Furthermore, another limitation spotted in this research is the research paradigm approved for the study (Positivist view), the researcher's subjective view affected the structure of the study. For example, the selection choice of oil tanker companies and the amount of the companies used as a case study, which is based on the researcher's personal interest and view. The researcher's personal decisions and views for the research design failed to be responsible for this issue, which does not justify the understanding of the relationship in this regard.

Furthermore, the use of quarterly data for U.S GDP and annual data for Inflation rate is due to the unforeseen coronavirus pandemic as schools in the United Kingdom had to close down., the author was unable to obtain weekly data for these variables, hence the use of annual and

quarterly data as a replacement. Also, this study does not differentiate between the types of oil price shocks, which is clearly seen when analysing the empirical results of the past studies reviewed. And the use of only one country (U.S.) for this research is considered as a limitation because oil tankers operate all across the world covering different areas, which will obviously have an impact on oil tanker companies who chatter vessels to transport oil. These include, geopolitics, conflicts causing restrictions of access through certain region, for example the sanctions imposed by the U.S. on Iran, which affected Iran economy causing various tanker attacks in the Persian Gulf although Iran denied being involved in such attacks (CNBC, 2019).

In conclusion, the following limitation mentioned make this study less objective and slightly narrow since only one country is used, a small amount of companies as case studies and only one stock index. This is why the research hypothesis of this study have been narrowed down to make the methodology valid. In conclusion, the methodology proposed for the data analysis are well designed and appropriate ensuring the research correlates properly with the designated research objectives and core philosophy.

CHAPTER FOUR: FINDINGS AND ANALYSIS

The primary focus of the research is to assess the influence of shocks with oil prices upon certain NYSE index companies as well as the crude tanker sector. The hypotheses of the research to study include if shocks in oil prices disrupt the performance of the oil tanker companies' stocks on the NYSE index and if these shocks in oil price impact the tanker market or not. The overall assumption is that with the fall of oil prices, there is a trend where tanker stocks and the stock market follow suite and fall as well. The research considers the oil prices from the WTI Oil and from the US Oil; there was also analysis of oil tanker organizations (4 of them) which entail Teekay Tankers, DHT Holdings, Frontline, and Euronav. In addition, there is a focus on the inflation within the US based on the US GDP as well as the NYSE index.

4.1 DESCRIPTIVE STATISTICS

For over a decade, the US oil barrel price on average has been about $7180; on the other hand, WTI oil has been at the level of approximately $70. In terms of the NYSE index, the average is at the level of 10,460 points as per the GDP of the US; in this case, there is the mean as well as the level of $18070. Furthermore, there is inflation which is approximately 1.75%. In assessing the row which is at the minimum level when the WTI and the US OIL hit the lowest level, the prices were at the amount of $3813 as well as $16.94 in a respective manner; this means that for the US Oil, the slump was at the level of 47% while for WTI it ended up being at 76% when considering the share prices and mean as the four organizations ended up having reduced value. For Frontline, the level was 82%, DHT had it at 70%, Euronav at 60% and Teekay Tankers ended up with 76% when considering the mean. For NYSE, there was a fall at the level of 35% by which the points went from 10,460 towards the level of 6,770. For the US GDP, the fall was at the level of 18.5% ($3350 approximately).

Table 2: DESCRIPTIVE STATISTICS

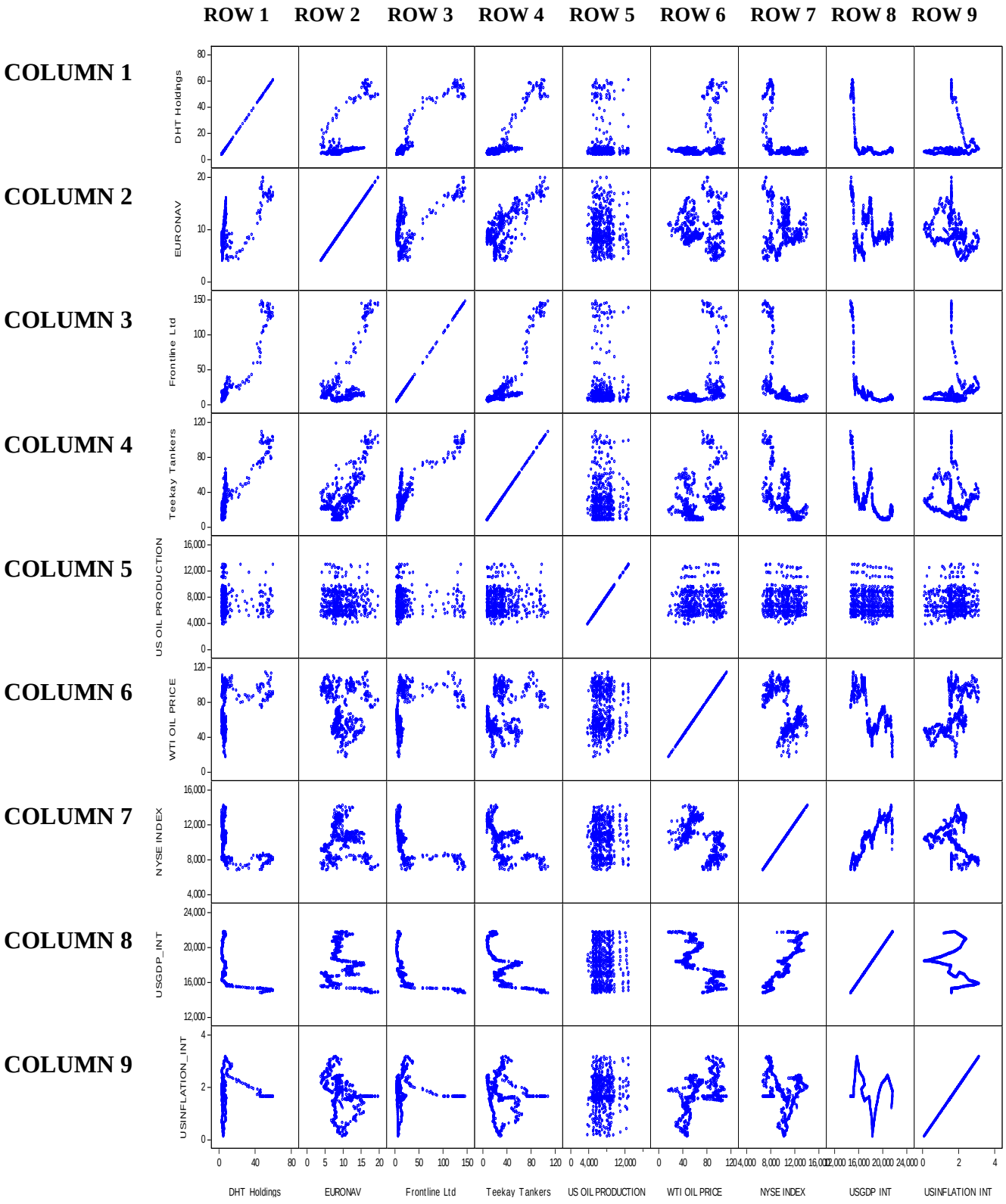
	DHT	EURONAV	FRONT	TEEK	US OIL PROD	WTI	NYSE	US GDP	US CPI
Mean	10.921	9.794	22.370	31.709	7180.630	69.997	10459.76	18069.39	1.757
Median	5.845	8.915	10.948	24.120	6703.000	63.720	10643.87	17997.50	1.724
Std. Dev.	14.073	3.311	33.468	23.410	1819.878	23.505	1862.483	2033.106	0.656
Jarque-Bera	1018.957	41.943	1504.756	238.295	91.992	37.683	23.725	27.955	12.380

P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.001	0.002
Skewness	2.497	0.694	2.752	1.455	0.949	0.088	-0.153	0.181	-0.377
Observations	522	522	522	522	522	522	522	522	522

Furthermore, the inflation of the US ended up falling by about 0.12% where on average the level is about 1.75%. In the standard dev value, the concept showcases the variables' volatility with the means by which the fluctuation of the price of oil compliments the prices of the shares as well as the stock market, inflation, and US GDP all by which fluctuate also. Due to the average being $1820 for the price of US Oil and $23.5 for the WTI, it is not as per the mean. For the NYSE Index, the average lands at the level of 1860 while $2033 is for the US GDP which is also not within the mean.

According to Goos & Meintrup, (2015), descriptive statistics focus on data and its description; the theory here emphasizes description where it is not inferential in nature. As a result, there aren't inferences made to the entire population which means it is not linked to probability. In using the descriptive statistics, it showcases how the shock in oil prices does have an impact on the performance of the stock market as well as the tanker market. According to (Michail & Melas, (2019), the theory shows that the tanker market is influenced and the performance of the stock as well; as a result, the theory is in support of the analysis as the impact of the prices of oil is two ways. Within the NYSE index, it showcases that there exist sectors which do benefit from the impact which entail cab sector as well as the airline sector. However, the analysis is limited as a reverse relationship isn't fully researched currently; this emphasizes the impact of the stock market on the price of oil. The impact here has to eb analyzed based on the indices of the stock market in aggregate including the data on the company level and if the company is from a nation which imports or exports oil.

Figure 2: SCATTER PLOT GRAPHS FOR ALL VARIBLES



It can be seen in the Observing Scatter plot above; it is apparent that there is a non-linear link with the relations here; there is no clear visibility in the patterns as well by which it complements the various volatility variables within the study. By scrutinizing column 5 and 6, it is evident that there exist two variables related to of crude oil upon the horizontal axis; in this case, in column 5 representing US Oil production, it shows a pattern which that showcases a relationship, which is trending with various variables. Nevertheless, the shades that are darker indicate that there is variation for the variables impacting different magnitudes, which ends up changing the prices of the US oil production. The plots here are from the top right area and the bottom left by which the stock price movement of the four companies within the NYSE is for the US Oil production movement.

Additionally, it can be noted in column 6 representing WTI price, that it showcases the pattern which displays a different shade; as a result, the impact magnitude then changes. With the WTI oil price dot plots, the movement is towards the right by which the price increase is evident; including the for the four companies in column (1, 2, 3, and 4), this is seen in their dot plots and the upward trend is also seen in the NYSE index in column 7. In addition, WTI oil price and U.S. oil production shady patterns are the variables that are assumed to darker near the center, which shows that there is the normal scenario case by which the results on the extreme happen regularly for the dot plots of the lower numbers; this is seen in the corners. As a result, a relationship does exist, but it isn't that strong as gauging its visible impact of the dot plots and their movement towards the different variables when comparing the oil prices.

According to Monge et al. ((2017), the production of oil is linked with the WTI price; there is also movement of the production and prices similarly. However, the higher production of oil happens prior to the WTI oil prices on the decline which shows a wavelength type of link. Furthermore, Zhang (2018) mentions that with high oil price, the tanker market dependency would be on the decline overall. With an understanding of the impact, Zhang (2018) also argues how the market can be much more efficient in comparison.

4.2 CORRELATION MATRIX

From the correlation test of the variables, the table showcases the relationship strength between the variables; the values here showcase that they are small in nature or near 0. Therefore, there is a link between the WTI oil price as well as the tanker companies closing stock prices that exist, but it is not significant. In addition, the NYSE index is in line with WTI oil prices and how it correlates with the four organizations, the relationship is positive because of the stock prices. As a result, WTI prices have a positive correlation with the Frontline, DHT holdings, Euronav, and Teekay Tankers. On the other hand, there is a negative correlation towards the NYSE index. The scatterplots diagram outlines this. However, Zhang (2018) mentions that if the price is too high of the WTI index, then the tanker dependency reduces which shows that there is some correlation at the extreme even if it is not the norm.

Table 3: CORRELATION MATRIX

	DHT	EURONV	FRONT	TEEK	US OIL PROD	WTI	NYSE	US GDP	US CPI
DHT	1	0.620	0.963	0.855	0.009	0.035	-0.538	0.564	7.874
EURONAV	0.620	1	0.631	0.733	-0.024	0.066	-0.068	0.181	0.349
FRONTLINE	0.963	0.631	1	0.864	0.000	0.379	-0.567	0.593	0.027
TEEKAY	0.855	0.733	0.864	1	0.002	0.286	-0.654	0.699	0.146
U.S.OIL PROD	0.009	0.024	0.000	0.002	1	0.018	-0.029	0.020	0.038
WTI OIL	0.353	0.066	0.379	0.286	0.018	1	-0.572	-0.726	0.493
NYSE	-0.538	-0.068	-0.567	-0.654	-0.029	-0.572	1	0.904	-0.146
U.S. GDP	-0.564	-0.181	-0.593	-0.699	-0.020	-0.726	0.904	1	-0.096
U.S. CPI	7.874	-0.349	0.027	-0.146	0.038	0.493	-0.146	-0.096	1

A general commonality shows that there exists a correlation within the oil prices increasing will also cause the cost of inputs on the rise too; this is for businesses as well as the expenses of the consumer. However, as there are complex links and relations involved with the factors and the industries, the oil price impact is two-way which entails prices of oil being higher that end up harming the consumers in areas such as transportation. Although, with the rise in oil price the oil companies then are more lucrative which causes more job creation, investments,

and general cash circulation. The testing of this theory was done by Andrea Pescatori (Pescatori & Mowry, 2008) on how the movement of the variables happen in the same direction in time but with a weak relationship and low correlation.

In the analysis, the correlation is low can be attributed to a major organization such as Teekay hitting highs with the low level of the oil price due to how stocks do not acquire benefits based on the oil cost to a large extent. Essentially, it can be seen that the oil cost in shipping ends up staying similar, but profit is acquired due to the cost of fuel being lower and the demand for transportation being higher with increments as per what the consumers want based on the prices of oil.

4.3 UNIT ROOT TEST

From the table, the result shows the unit root test regarding each of the 9 variables being within level and based on the initial difference. As for the null hypothesis, it mentions how within these variables, there is the unit root and if the variable has a unit root, then the data is not significant. Therefore, if the variable's probability is lower than 0.05, then it shows that the data for this variable ends up being quite significant and there is a rejection of the null hypothesis regarding the variable.

Table 4: UNIT ROOT TESTS (ADF) AT LEVEL

	At Level									
		DHT	EURONV	FRONT	TEEKAY	US_OIL_PRO	WTI	NYSE	U.S.GDP	U.S. CPI
With Constant	t-Stat	-3.0127	-2.7391	-5.024	-3.4529	-10.4822	-1.1326	-1.8171	-0.63	-2.6483
	Prob.	***0.0344***	***0.0681***	***0.0000***	***0.0097***	***0.0000***	***0.7042***	***0.3721***	***0.8610***	***0.0840***
With Constant & Trend	t-Stat	-1.8233	-2.5802	-3.657	-2.8947	-10.7293	-2.4195	-3.6695	-3.721	-2.8468
	Prob.	***0.6922***	***0.2897***	***0.0262***	***0.1650***	***0.0000***	***0.3689***	***0.0252***	***0.0218***	***0.1812***
Without Constant & Trend	t-Stat	-3.5737	-1.4322	-5.58	-3.481	-0.3648	-0.8166	0.6332	2.5334	-1.4871
	Prob.	***0.0004***	***0.1419***	***0.0000***	***0.0005***	***0.5530***	***0.3619***	***0.8528***	***0.9975***	***0.1283***

Table 5: UNIT ROOT TESTS (ADF) AT FIRST DIFFERENCE

		DHT	EURONV	FRONT	TEEKAY	US_OIL_PRO	WTI	NYSE	U.S.GDP	U.S. CPI
With Constant	t-Stat	-20.42	-25.172	-3.984	-23.409	-5.5183	-20.653	-23.81	-3.9844	-1.8006
	Prob.	***0.0000***	***0.0000***	***0.0016***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0016***	***0.3803***
With Constant & Trend	t-Stat	-20.69	-25.21	-4.6885	-23.549	-5.5125	-20.646	-23.8	-3.9655	-1.9085
	Prob.	***0.0000***	***0.0000***	***0.0008***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0103***	***0.6486***
Without Constant & Trend	t-Stat	-20.28	-25.178	-3.8801	-23.298	-5.524	-20.664	-23.79	-2.9541	-1.7798
	Prob.	***0.0000***	***0.0000***	***0.0001***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0031***	***0.0714***

In the assessment of the probabilities for the, it can be seen in table 4 testing the unit root at level that the variables, Frontline, DHT, Teekay, and US Oil production are highly significant due to the probability being lower than 5% or 0.05; there is a lack of significant to the rest of the variables. For these variables to be significant, the test of the unit root must be with the initial difference being constant, for the variables get their initial lag. The difference is clear at first since the variables' probabilities are lower than the amount of 0.05 in which the significance of the data is there and there is the hypothesis rejection regarding the unit root; however, this is not the case for US inflation, there is another difference to be considered within the unit root for significance. For the null hypothesis to be rejected, the implication is that there is a stationary level to the series; this refers to how time shifting doesn't end up adjusting the distribution shape.

With the unit root testing for the trend and consistency, the NYSE index, Frontline, U.S. GDP, and U.S. oil production price end up having to reject the null hypothesis with significance as compared to stationarity. The initial variation of the variables ends up having significance; this is the case for all except U.S. inflation. In viewing without the trend and constancy of the unit root, there is insignificance of the data for U.S. Oil production, NYSE Index, WTI Oil, U.S. GDP, and U.S. inflation; this is due to how the probabilities ending up being higher than the level of 0.05. To acquire the null hypothesis rejection or stationery, the lack of trends and constancy for the unit root test initially causes the significance within the variables except in

regard to U.S. inflation. The conclusion here is that for each case, there is insignificance in inflation data of the U.S. which can have annual calculation by which there is significance. In the unit root test, the second difference will be obtained for significance of the U.S. inflation data.

4.4 HYPOTHESIS TESTING

The VAR is common for systems which are used for forecasting; this is regarding the time series dataset, which is interrelated to assess the random disturbances of the dynamic impact on the variable system. Within the study of the research, the testing of the initial hypothesis is on if oil price shocks disrupt the tanker companies listed on the NYSE index including the stock market. The initial variation of the NYSE and WTI oil price are seen as stationary by which the lags are optimal; there is also the table for the VAR output below, where the impulse graphs are there to comprehend the various impacts.

Figure 3: VAR ESTIMATION FOR FIRST HYPOTHESIS

Vector Autoregression Estimates
Date: 09/05/20 Time: 16:51
Sample (adjusted): 4/09/2010 3/20/2020
Included observations: 520 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	US_OIL_P...	WTI_OIL_PR...	NYSE_INDEX
US OIL PRODUCTION...	0.359236	-1.06E-05	0.000628
	(0.03914)	(7.0E-05)	(0.00598)
	[9.17724]	[-0.15106]	[0.10513]
WTI_OIL_PRICE(-1)	13.80312	1.080154	6.817059
	(24.4133)	(0.04381)	(3.72700)
	[0.56539]	[24.6554]	[1.82910]
NYSE_INDEX(-1)	-0.527777	0.000660	0.950213
	(0.28733)	(0.00052)	(0.04386)
	[-1.83683]	[1.27963]	[21.6623]
C	8194.907	3.336220	61.49364
	(750.443)	(1.34668)	(114.565)
	[10.9201]	[2.47736]	[0.53676]

From the first row and second row, it can be identified in figure 3 that the t statistics here in regards to oil price and the NYSE Index end up being lower than the critical values and for this, the null hypothesis is not rejected as compared to the hypothesis in terms of oil price shocks and their impact upon the NYSE Index and oil tanker companies.

There are some clarifications to consider from this test; it is evident that the there are various other prices factors within the economy which have an impact; for instance, there is consideration of the loan fees, the renumeration, the plastic, the metals (industrial), and innovation in Information Technology by which the costs of energy and fuel change. According to (Jareño & Negrut, 2016), there are macroeconomic factors in play as well which end up having an impact which is an important consideration. There is also the consideration that organizations may have ended up much more complex than before in terms of forecasting the outcome; in this case, it is imperative to consider envisioning the shift within the factor costs by which the company is focused on the cycles of switch creation based on the costs of fuel suddenly. It is recommended by some analysts in business that the frequent costs in stock end up increasing based on their desire in cash amounts which occurs regularly in the costs of oil.

It is important to have a proper differentiation between the costs of oil, its essential drivers and the stock costs. The costs of oil are managed by the interest and flexibility on items which are based on oil. When there is an extension in the financial area, there may be a rise in cost because of higher utilization; there would be a fall otherwise due to the creation which is expanded or the supply increase. With the fall and rise of the costs of stock being dependent on the income reports of the corporations, there are inherent qualities here as well as hazard resistances which are speculator in nature; overall, many variables exist. Regardless of how the costs of the stock are together lumped and summed, it is possible that the costs of oil would impact some divisions more than others.

Ultimately, the intricacy of the economy is high to consider how all businesses would be impacted accurately. Within the Cleveland Federal Reserve Bank, the specialists outline the costs of development in the financial exchange and learned about how a low link exists between the stock market and costs of oil. In the study, there is a lack of demonstration on how the oil cost is limited on the costs of financial exchange; regardless, it is recommended that experts can’t fully gauge the responses of the stocks and costs of oil. However, (Rahman, 2020) mentions how oil price volatility has a negative impact on the US stock market; this would outline how volatility is a greater concern than the simple rising and falling of prices. In this case, if the investors are able to accurately predict the prices of oil, they may not deter from activities while volatility would otherwise.

Figure 4: VAR ESTIMATION FOR SECOND HYPOTHESIS

Vector Autoregression Estimates
Date: 09/05/20 Time: 17:45
Sample (adjusted): 4/30/2010 3/20/2020
Included observations: 517 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	D(WTI_OIL_...	D(EURONAV)	TEEKAY_TA...	DHT_HOLD...	FRONTLINE...	US_OIL_P...
D(WTI_OIL_PRICE(-1))	0.085175	0.009898	-0.043214	-0.010501	0.057984	29.06917
	(0.04547)	(0.00903)	(0.02914)	(0.01268)	(0.03118)	(23.7673)
	[1.87327]	[1.09663]	[-1.48302]	[-0.82821]	[1.85981]	[1.22307]
D(WTI_OIL_PRICE(-2))	0.023567	-0.023135	0.006855	-0.020353	0.015126	-40.21706
	(0.04596)	(0.00912)	(0.02945)	(0.01282)	(0.03151)	(24.0227)
	[0.51280]	[-2.53597]	[0.23275]	[-1.58811]	[0.48001]	[-1.67412]
D(WTI_OIL_PRICE(-3))	0.014687	0.024058	0.004949	-0.004234	-0.033724	19.26794
	(0.04595)	(0.00912)	(0.02945)	(0.01282)	(0.03151)	(24.0213)
	[0.31959]	[2.63729]	[0.16803]	[-0.33041]	[-1.07024]	[0.80212]
D(WTI_OIL_PRICE(-4))	-0.022004	-0.012119	0.031028	-0.012244	0.021684	-22.31751
	(0.04598)	(0.00913)	(0.02947)	(0.01282)	(0.03153)	(24.0350)
	[-0.47855]	[-1.32771]	[1.05297]	[-0.95491]	[0.68776]	[-0.92854]
US_OIL_PRODUCTION...	1.12E-05	2.39E-05	7.94E-05	7.81E-07	5.35E-05	0.163860
	(8.5E-05)	(1.7E-05)	(5.4E-05)	(2.4E-05)	(5.8E-05)	(0.04426)
	[0.13198]	[1.42058]	[1.46280]	[0.03309]	[0.92099]	[3.70196]
US_OIL_PRODUCTION...	9.06E-05	-2.18E-06	2.56E-05	3.67E-06	2.48E-05	-0.402866
	(8.3E-05)	(1.7E-05)	(5.3E-05)	(2.3E-05)	(5.7E-05)	(0.04347)
	[1.08953]	[-0.13232]	[0.48081]	[0.15818]	[0.43432]	[-9.26767]
US_OIL_PRODUCTION...	-3.81E-05	1.40E-05	1.44E-05	2.62E-06	7.36E-05	-0.286989
	(8.3E-05)	(1.6E-05)	(5.3E-05)	(2.3E-05)	(5.7E-05)	(0.04320)
	[-0.46119]	[0.85611]	[0.27102]	[0.11356]	[1.29909]	[-6.64267]
US_OIL_PRODUCTION...	9.88E-05	1.96E-05	6.68E-05	4.84E-07	5.43E-05	-0.166678
	(8.5E-05)	(1.7E-05)	(5.4E-05)	(2.4E-05)	(5.8E-05)	(0.04428)
	[1.16626]	[1.16501]	[1.23072]	[0.02048]	[0.93506]	[-3.76430]

For testing second hypothesis concerning the tanker market. This focuses on oil prices and their influence on the tanker market. In the observations of the fifth and first rows in figure 4, it is evident that there is lack of critical value within the t stats, this means the t stats is greater than the critical value and, in this case, the null hypothesis is rejected and the alternate hypothesis is accepted. In other words, since the alternate hypothesis is accepted, it can be identified from the result of the second hypothesis test that oil prices shocks do not have an impact on the tanker market since the rejection failure of the null hypothesis is evident. There is support for the intuition that there is price change for the hypothesis which will have an impact due to how oil remains at the core of the issue; since the impact level and direction are not evident from the test. In terms of (Poulakidas & Joutz, 2009) research on the impact of oil prices on tanker rates, there are certain variables used for their analysis such as the Baltic Dirty Tanker Index, which is a fundamental variable for analyzing the tanker market.

Furthermore, this variable serves as a suggestion as including it may still have yielded the same result. It is only mentioned because (Poulakidas & Joutz, 2009) research result proved that oil prices had there was higher pressure on tanker spot rates cause by oil prices.

Figure 5: VAR ESTIMATION FOR THIRD HYPOTHESIS

Vector Autoregression Estimates
Date: 09/10/20 Time: 22:01
Sample (adjusted): 4/09/2010 3/20/2020
Included observations: 520 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	USGDP_INT	USINFLATI...	DHT_HOLD...	TEEKAY_TA...	EURONAV	FRONTLINE...
USGDP_INT(-1)	1.921484	1.08E-05	-0.001878	-0.005937	-0.000608	0.001210
	(0.01728)	(1.5E-05)	(0.00294)	(0.00765)	(0.00212)	(0.00778)
	[111.168]	[0.70273]	[-0.63765]	[-0.77558]	[-0.28653]	[0.15547]
USGDP_INT(-2)	-0.921797	-1.13E-05	0.001892	0.005451	0.000619	-0.001199
	(0.01727)	(1.5E-05)	(0.00294)	(0.00765)	(0.00212)	(0.00778)
	[-53.3602]	[-0.73510]	[0.64281]	[0.71252]	[0.29167]	[-0.15414]
USINFLATION_INT(-1)	20.14442	1.957746	0.178009	-5.150713	-0.371745	1.423570
	(12.6616)	(0.01130)	(2.15702)	(5.60714)	(1.55510)	(5.69905)
	[1.59099]	[173.212]	[0.08253]	[-0.91860]	[-0.23905]	[0.24979]
USINFLATION_INT(-2)	-19.63141	-0.959037	-0.235335	5.429108	0.356973	-1.379752
	(12.5823)	(0.01123)	(2.14352)	(5.57204)	(1.54537)	(5.66338)
	[-1.56024]	[-85.3853]	[-0.10979]	[0.97435]	[0.23100]	[-0.24363]
DHT_HOLDINGS(-1)	0.016167	-4.03E-05	0.974485	0.013505	-0.005374	0.845661
	(0.27641)	(0.00025)	(0.04709)	(0.12241)	(0.03395)	(0.12441)
	[0.05849]	[-0.16345]	[20.6943]	[0.11032]	[-0.15831]	[6.79710]
DHT_HOLDINGS(-2)	-0.043987	0.000178	-0.061794	0.033366	-0.016659	-0.869281
	(0.26444)	(0.00024)	(0.04505)	(0.11711)	(0.03248)	(0.11903)
	[-0.16634]	[0.75339]	[-1.37170]	[0.28492]	[-0.51292]	[-7.30333]
TEEKAY_TANKERS(-1)	-0.164190	2.26E-05	-0.001186	0.857515	0.006075	0.033067
	(0.09307)	(8.3E-05)	(0.01586)	(0.04122)	(0.01143)	(0.04189)
	[-1.76414]	[0.27172]	[-0.07481]	[20.8054]	[0.53141]	[0.78934]
TEEKAY_TANKERS(-2)	0.127958	-0.000108	-0.007964	0.049520	-0.006452	-0.027611
	(0.09001)	(8.0E-05)	(0.01533)	(0.03986)	(0.01106)	(0.04051)
	[1.42160]	[-1.34423]	[-0.51937]	[1.24234]	[-0.58366]	[-0.68151]
EURONAV(-1)	0.292785	-0.000299	-0.135443	0.071919	0.867537	1.217927
	(0.38528)	(0.00034)	(0.06564)	(0.17062)	(0.04732)	(0.17341)
	[0.75994]	[-0.86901]	[-2.06357]	[0.42152]	[18.3335]	[7.02319]
EURONAV(-2)	-0.005362	0.000327	0.182987	0.339271	0.111238	-1.215737
	(0.39676)	(0.00035)	(0.06759)	(0.17570)	(0.04873)	(0.17858)
	[-0.01351]	[0.92251]	[2.70726]	[1.93094]	[2.28275]	[-6.80770]
FRONTLINE_LTD(-1)	0.019845	2.66E-05	0.000671	0.329259	0.001363	0.842330
	(0.08535)	(7.6E-05)	(0.01454)	(0.03780)	(0.01048)	(0.03842)
	[0.23251]	[0.34860]	[0.04616]	[8.71134]	[0.13002]	[21.9264]
FRONTLINE_LTD(-2)	-0.018711	-4.29E-05	0.036363	-0.338468	0.008202	0.149684
	(0.08808)	(7.9E-05)	(0.01500)	(0.03900)	(0.01082)	(0.03964)
	[-0.21244]	[-0.54546]	[2.42345]	[-8.67763]	[0.75819]	[3.77570]
C	4.337098	0.012213	-0.265148	6.865366	0.073625	-0.256721
	(3.94159)	(0.00352)	(0.67149)	(1.74552)	(0.48411)	(1.77413)
	[1.10034]	[3.47093]	[-0.39487]	[3.93314]	[0.15208]	[-0.14470]

Figure 5 represents the VAR third hypothesis test on the impact of macroeconomic factors on the oil tanker companies' performance of stock. There are multiple macroeconomic factors, which are potentially impactful on the performance of companies; this performance is based on income which determines the overall performance at the stock market. Also, multiple macroeconomic factors are to be considered some of the main ones include inflation and GDP. The overall activities of the tankers is international especially in terms of their shipping routes;

as they have to plan and manage their activities, the change in macroeconomic factors may or may not have a disruptive influence on the stock performance of these organizations by which the hypothesis testing is done for. From scrutinizing the VAR estimation for of the third hypothesis maintaining the perspective on the 4 tanker companies utilizing towards inflation as well as GDP, there is a lack of null hypothesis rejection due to the t stats being lower than the critical values. From the results, the test fails to reject the null hypothesis meaning that Inflation and GDP play a key role in impacting the stock performance of the oil tanker companies and the implication here is that the tanker market has been impacted overall.

The study by Yu et al. (2019) is closely related with this test, they conducted a study about understanding the effect on tanker companies based on macroeconomic factors. It was difficult as there are series macroeconomic factors, which has an effect on the shipping market. In their research the shipping market network structure is affected due to macroeconomic factors which largely includes the crude oil price set internationally; in this case, the structure has seen rapid movement and this congruent with the result of obtained from the third hypothesis. As a result, Yu et al. (2019) suggested that diversification for oil tanker companies was beneficial to prevent changes in the shipping market structure caused by macroeconomic factors. Finally, as discussed by Yu et al. (2019) the price shocks have the biggest impact by which the structure changes which is aligned with the results of the hypothesis testing.

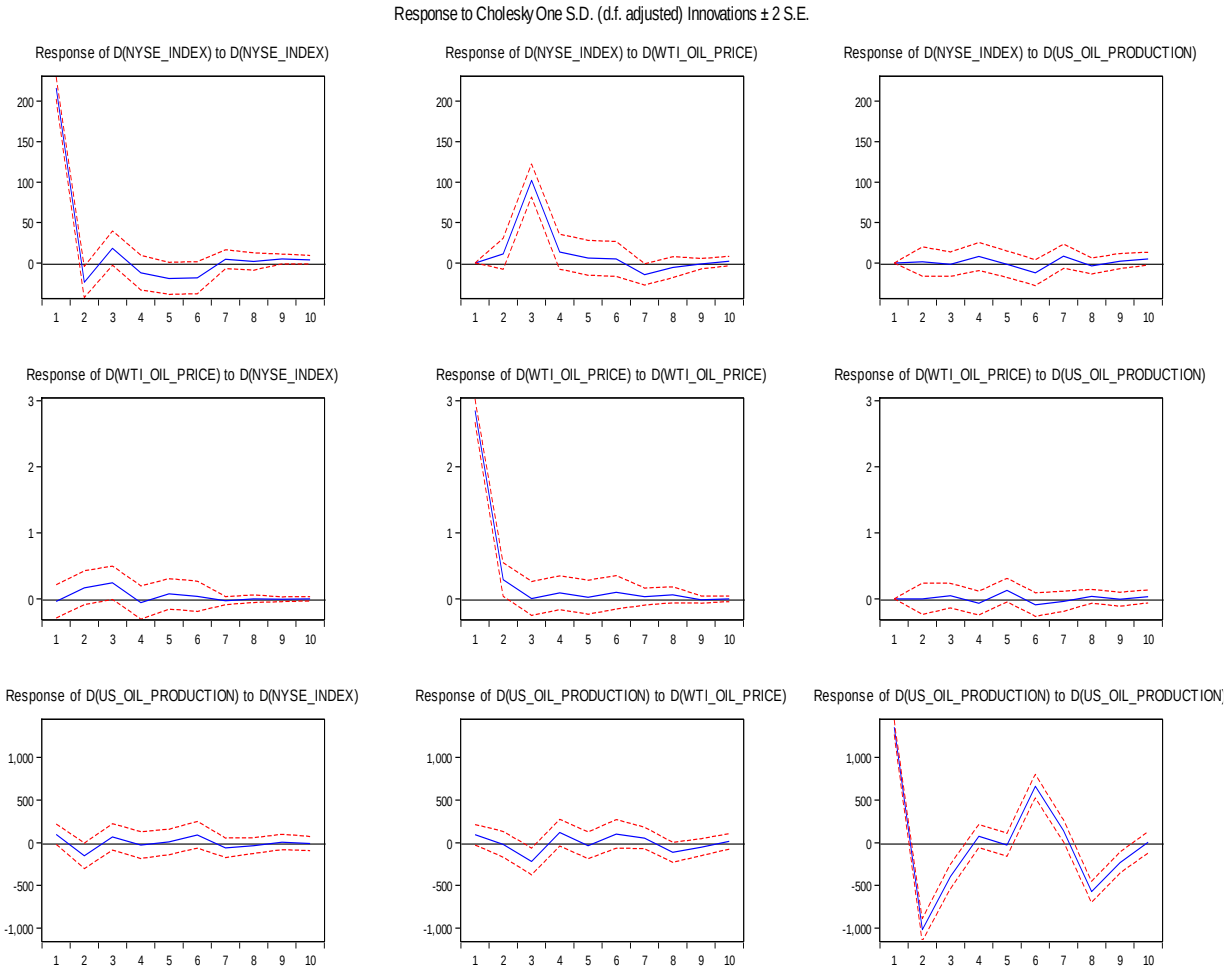
From the analysis, this research investigated the impact of oil price shocks and macroeconomic factors on the stock performance of oil tanker companies listed on the NYSE index for a 10-year period (2010 to 2020), which is after the World Financial crisis in 2008. As a result, the global economy was in a healing process caused by the crisis in order to maintain stability and growth worldwide. Although, the period used for this research covers the popular oil price decline that began in 2014. According to (Brian, 2018), the price of crude oil declined from $112 in June 2014 to $31 in January 2016, which was a cumulative decrease of more than 70%, and the study concluded that there was no evidence the decline was caused by U.S. shale revolution rather, it was impacted by weakening of oil demand globally. Also, as the period for the research analysis ends in March 2020, which is the year this research is carried out, there are some notable events that have occurred in relation to oil price volatility. Firstly, the Corona virus Pandemic (Covid-19) that began in late 2019 in Wuhan, China massively contributed to the decline in oil prices. According to (Canada Energy Regulator, 2020), WTI price decreased by 65% as at March 2020, from its price in January due to countries attempting to contain the Coronavirus through travel restrictions. Also, in terms of geopolitics in 2020, OPEC+ countries

failed to make an agreement to cut down the production of oil. As a result, OPEC nations such as United Arab Emirates and Saudi Arabia continued to produce oil at a larger scale, which may lead to oversupply of oil (Canada Energy Regulator, 2020).

4.4 IMPULSE RESPONSE FUNCTIONS

In the figure below, the graphs are there regarding the testing of the variables as depicted in the VAR; the variable response here as per the shocks that the other variables go through. In the trend, it can be observed that the line graphs end up going to the line of origin regularly which adheres to figuring out the impact happening on the oil price and stocks which isn't too high.

Figure 6: IMPULSE RESPONSE FUNCTIONS FOR VARIABLES



Overall, the interpretations and observations above from the test conducted are fundamental for summarizing the findings in the final chapter. The results of the data analysis are associated

with the theoretical framework adopted in the literature review, which is from the results of testing the 3 developed hypotheses. The main findings are as follows.

First, the first hypothesis developed focused on oil prices shocks disrupting the stock performance of Oil tanker firms listed on the NYSE index. The result obtained from the VAR estimation test proved that there was no rejection of the null hypothesis meaning that for a fact oil price shocks actually disrupt the stock activities of tanker shipping companies on the NYSE index. In other words, the null hypothesis is accepted supporting the empirical result of past research discussed in the literature review (Drobetz, et al; Manning, 1991; Boyer and Filion, 2007; Faff and Marshall, 2005) and this answer the first research question. The next hypothesis developed for testing, concentrated on how oil price shocks have an impact on the tanker market, the result from the findings and analysis states that there was a rejection failure of the null hypothesis, which must have occurred because this study failed to adopt variables used from the study of (Poulakidas & Joutz, 2009) and (Wenming , et al., 2013). Their research used variables such as the BDTI (Baltic Dirty Tanker Index) along with oil prices (Brent and WTI), which is a fundamental variable for analysing the Tanker market as it reflects the conditions of the tanker market including macroeconomic determinants related to the tanker market. And the BDTI is divided into four sub-indices which are mentioned in the first chapter of this study (Panamax, Aframax, VLCC and Suezmax) in terms of ship types (Wenming , et al., 2013). However, this study main focus in the analysis was on the association of oil price fluctuations and macroeconomic factors on stock returns of tanker companies.

Finally, the last hypothesis tested was on the macroeconomic factors having an impact on the stock performance of oil tanker firms. There was a lack of null hypothesis rejection, in other words there was not enough evidence to reject the null hypothesis as the t statistics value was lower than the critical value. The macroeconomic variables used for the test were the U.S. GDP and Inflation, from the description of the events that occurred during the period (2010-2020) selected for this study, it was evident that these variables were going to affect the performance of tanker firms stock returns such as the decline in oil prices, which is a major driver of the tanker sector.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

In the following chapter, a short summary of the findings and results from the findings and analysis chapter. This research conducted an investigation in attempt to understand the impact of oil price shocks and macroeconomic factors on Oil tanker companies listed on the New York Stock Exchange (NYSE) index located in the United States. Also, the study has extended on the existing literature by conducting the research by focusing the Tanker market within the shipping sector. From the dataset from the period of 2010 to 2020, this study analysed the closing stock price of 4 oil tanker companies, including the NYSE closing price along with applying U.S. weekly crude oil production, U.S. Inflation and GDP. The analysis is performed by using the VAR model to test the hypothesis developed, which is associated with the theoretical framework in the literature review section. Finally, a set of appropriate recommendations along with setbacks will be outlined for future research.

5.1 SUMMARY OF FINDINGS

From the test results obtained and interpreted in the previous chapter analysing the impact of oil price shocks on oil tanker companies (DHT Holdings, Euronav, Teekay Tankers and Frontline limited) from 2010 to 2020, the results provided answers for formulated research questions and the selection between the 3 null and alternate hypotheses established. Here are the research questions and hypothesis formulated in the introduction chapter.

1. Do Oil Price shocks disrupt the stock market performance of Oil tanker firms listed on the NYSE between the period 2010 to 2020?
2. What is the impact of Oil price shocks on the Tanker Market?
3. Do Macroeconomic factors have an impact on the stock performance of oil tanker firms?

The alternate and null hypothesis for this research:

H0: Oil prices Shocks disrupt the stock performance of Oil Tanker firms listed on the NYSE index.

H1: Oil prices Shocks do not disrupt the stock performance of Oil Tanker firms listed on the NYSE index.

H0: Oil price shocks have an impact on the Tanker Market.

H1: Oil price shocks do not have an impact on the Tanker Market.

H0: Macroeconomic factors have an impact on the stock performance of oil tanker firms.

H1: Macroeconomic factors do not have an impact on the stock performance of oil tanker firms.

Hence, the observed findings are as follows.

First, the following hypothesis were developed for testing the first hypothesis focused on the impact of oil price shocks on oil tankers listed on the New York Stock Exchange (NYSE). From the VAR estimation for the first hypothesis, there was failure to reject the null hypothesis, which correlates with the fact that oil price shocks disrupt the stock performance of oil tanker firms. To justify this intuition, it can be seen in the fourth chapter that several events that occurred during the period of 2010 to 2020 played a role in this result. For instance, the aftermath of the global financial crisis that occurred in 2008. In addition, this result correlates with the theoretical framework reviewing past studies that had result congruent with result such as, review (Drobetz, et al; Manning, 1991; Boyer and Filion, 2007; Faff and Marshall, 2005).

The second research question deals with the impact oil price fluctuations on the tanker, the VAR estimation that determined the result for answering this question indicated that there was a rejection failure of. The null hypothesis. As a result, the alternate hypothesis was selected, stating that oil price shocks do not have an impact on the tanker market. As seen in the data analysis chapter, the results of the estimation of the null hypothesis was justified by referencing (Poulakidas & Joutz, 2009) study concerning a key missing variable. Lastly, the third and final hypothesis stated above deals with how macroeconomic factors (U.S. GDP and U.S. Inflation) impact the stock performance of oil tanker companies. The VAR estimation result for this hypothesis state that the null hypothesis is accepted because the t statistics was lower than the critical values. Therefore, macroeconomic factors do affect the stock performance of these companies. The result for the third hypothesis test was supported by the conducted by (Yu, et al., 2019).

5.2 RECOMMENDATIONS FOR FUTURE RESEARCH

Through the thorough examination of the impact of oil price shocks and macroeconomic variables on the stock performance of oil tanker companies listed on the NYSE index, here are recommendations for future research.

A setback that was discussed in the data and methodology chapter was on the sample size provided for the amount of companies in the oil tanker sector. Due to strict selection procedures, this study was bound to exclude different companies. A larger sample size may

obtain results for our findings concerning the impact of oil price volatility on the crude tanker market. And also including other sectors within the shipping sector such as, Drilling, Exploration and Offshore support vessels (OSV) industry. If a less strict criteria are used, it will be interesting to see the result from this research will be valid for future research. Another step that will be advice for improving the methodology is future researcher could apply other statistical methods like multiple factors models and Capital Asset Pricing Model for abnormal returns that can be complex. And the result from these suggested models can be applied to verify the results and trends from this study and other research work.

As this study limits its analysis to only observe how the oil tanker companies react to oil shocks in WTI oil price, the study does not concentrate on underlying sources of the shock (demand and supply shocks. Using a similar study, future researchers may be able to understand and have a clearer view as to why different industries react differently to different oil shocks. A research on the underlying reason behind this may illustrate a clearer narrative supporting why different events yield different results. It is evident that there is more room for development and future research of this study. I hope that further developments of this research can help with not only academic research but also ship owners, shipping practitioners and investors with their decision-making process.

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APPENDICES

Appendix 1: Descriptive Statistics

	DHT_HOLD...	EURONAV	FRONTLINE...	TEEKAY_TA...	US_OIL_P...	WTI_OIL_PR...	NYSE_INDEX	USGDP_INT	USINFLATI...
Mean	10.92168	9.794764	22.37067	31.70199	7180.630	69.99778	10459.76	18069.39	1.757437
Median	5.845000	8.915425	10.94869	24.12000	6703.000	63.72000	10643.87	17997.50	1.724068
Maximum	60.48000	19.84598	147.0446	108.8000	12900.00	113.9300	14183.20	21747.39	3.156842
Minimum	3.400000	3.956649	3.913457	7.449600	3813.000	16.94000	6770.730	14721.35	0.118627
Std. Dev.	14.07315	3.311464	33.46826	23.41073	1819.878	23.50515	1862.483	2033.106	0.656605
Skewness	2.497088	0.694057	2.752246	1.455101	0.949329	0.088265	-0.153773	0.181490	-0.377031
Kurtosis	7.680470	2.960217	9.235765	4.576970	3.790335	1.695622	2.001877	1.925964	2.974963
Jarque-Bera	1018.957	41.94365	1504.756	238.2954	91.99228	37.68330	23.72565	27.95543	12.38088
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000007	0.000001	0.002049
Sum	5701.118	5112.867	11677.49	16548.44	3748289.	36538.84	5459992.	9432222.	917.3820
Sum Sq. Dev.	103185.9	5713.179	583584.7	285540.4	1.73E+09	287848.5	1.81E+09	2.15E+09	224.6187
Observations	522	522	522	522	522	522	522	522	522

Appendix 2: Correlation Matrix

	DHT_HOLD...	EURONAV	FRONTLINE...	TEEKAY_TA...	US_OIL_P...	WTI_OIL_PR...	NYSE_INDEX	USGDP_INT	USINFLATI...
DHT_HOLD...	1	0.62078922...	0.96316379...	0.85584403...	0.00977067...	0.35380821...	-0.5387910...	-0.5646236...	7.87477477...
EURONAV	0.62078922...	1	0.63189365...	0.73342515...	-0.0248796...	-0.0660701...	-0.0685772...	-0.1815539...	-0.3492780...
FRONTLINE...	0.96316379...	0.63189365...	1	0.86436718...	0.00037433...	0.37980717...	-0.5675710...	-0.5930693...	0.02716041...
TEEKAY_TA...	0.85584403...	0.73342515...	0.86436718...	1	0.00276020...	0.28675899...	-0.6543696...	-0.6999116...	-0.1460876...
US_OIL_P...	0.00977067...	-0.0248796...	0.00037433...	0.00276020...	1	0.01814714...	-0.0295198...	-0.0204425...	0.03855891...
WTI_OIL_PR...	0.35380821...	-0.0660701...	0.37980717...	0.28675899...	0.01814714...	1	-0.5726407...	-0.7263080...	0.49323147...
NYSE_INDEX	-0.5387910...	-0.0685772...	-0.5675710...	-0.6543696...	-0.0295198...	-0.5726407...	1	0.90409859...	-0.1461329...
USGDP_INT	-0.5646236...	-0.1815539...	-0.5930693...	-0.6999116...	-0.0204425...	-0.7263080...	0.90409859...	1	-0.0969143...
USINFLATI...	7.87477477...	-0.3492780...	0.02716041...	-0.1460876...	0.03855891...	0.49323147...	-0.1461329...	-0.0969143...	1

Appendix 3: Variable Description Table

Variables	Description	Source
WTI OIL	Benchmark Price	Thomson Reuters
DHT Holdings	Oil Tanker Company	Thomson Reuters and Clarksons Shipping Intelligence.
Euronav	Oil Tanker Company	Thomson Reuters and Clarksons Shipping Intelligence
Teekay Tankers	Oil Tanker Company	Thomson Reuters and Clarksons Shipping Intelligence
Frontline Limited	Oil Tanker Company	Thomson Reuters and Clarksons Shipping Intelligence
NYSE	Stock Market	Thomson Reuters
U.S. Inflation	Macroeconomic Indicator	Federal Reserve Economic data (FRED)
U.S. GDP	Macroeconomic Indicator	Federal Reserve Economic data (FRED)