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Leveraging bargaining power in the international crude oil market: an analytical exploration of China's trade dynamics with leading oil-exporting nations

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Leveraging Bargaining Power in the International Crude Oil Market:

An Analytical Exploration of China's Trade Dynamics with Leading Oil-Exporting Nations

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Declaration

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

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(Date): 21/09/2023

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Abstract

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The international trade of crude oil has become a prominent feature in the international market for numerous decades, mostly driven by industrialization and its significant impact on the economy of various nations, notably China. Due to the globalized nature of its trade, the initiation of transactions involving crude oil entails a series of discussions, bilateral agreements, and the strategic utilization of competitive advantage, ultimately resulting in the party possessing greater bargaining power securing more advantageous terms. Over the past twenty years, China has experienced significant economic expansion, leading to its emergence as a prominent crude oil importer. Consequently, this study centers on China due to its escalating significance within the global crude oil market. This study investigates the extent of China's bargaining strength in the crude oil trade, both in relation to individual countries and its top five crude oil partners. Throughout the time frame under examination, China's primary counterparts in the crude oil sector are Saudi Arabia, Angola, Russia, Iran, and Oman. This study utilized a regression model to analyze monthly panel data and examine the impact of fourteen distinct factors on China's bargaining power with its top five crude oil producing countries. The study focused on a twenty-six-year period from 1995 to 2021, during which China emerged as one of the largest importers of crude oil.

The study's results indicated that certain macroeconomic indicators, which were chosen with care, played a significant role in determining the negotiating power of China and its primary trading partners in the crude oil industry. The findings also indicate that, from a statistical perspective, China's five primary trading partners in crude oil possess a greater degree of bargaining power in their trade relations with China. Moreover, this study examined the correlation between China's balance of trade and its primary crude oil trading partners, as well as the negotiating strength of both China and the chosen nations. The findings of this study indicate that there is no significant relationship exists between these variables. The study additionally offers suggestions for countries to contemplate while choosing optimal policy positions regarding crude oil trade.

KEYWORDS: Bargaining power, crude oil, oil trading partners, balance of trade

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List of abbreviations

BP	British Petroleum
CNOOC	China National Offshore Oil Corporation
EU	European Union
FDI	Foreign Direct Investments
OCC	Oil consuming countries
OECD	Organization for Economic Cooperation and Development
OPC	Oil Producing Countries
OPEC	Organization of Petroleum Exporting Countries
Pvalue	Present Value
UN COMTRADE	The United Nations Commodity Trade Statistics Database
WTO	World Trade Organization

Chapter One: Introduction

After several decades of use, crude oil continues to be a source of energy and a significant element in our daily lives and activities. However, the only things that must have changed over time are the modern technologies used in it's storage, extraction, and handling, as well it's transportation. The demand for crude oil is driven by economic growth, which means a country's volume of crude oil demand would be based on it's growing economy. This is because the world depends on crude oil and crude oil products for transportation, heating, to generate electricity, and many more. The crude oil business, which used to be traded based on a cooperative stage, has now been overtaken by fierce competition, foreign direct investments, expropriation, and most frequently, unfavorable bargaining agreements by the countries that import crude oil from oil-producing countries. Considering the fact that these oil-importing countries are also non-oil countries, they pose challenges to the oil-producing countries with respect to oil trade agreements (Vivoda, 2011). However, in the international crude oil trade, bargaining and negotiations are the best results, rather than market positions.

Just as the concept of bargaining is used in the physical market and corporative market settings, it is also essential in the international trade of commodities, also due to the increasing pace of globalization and the commercial relationships between countries. As an international business, just like other businesses, the buying and selling of crude oil is transacted between countries, with one party being in possession of an excessive amount of crude oil, making it the oil-producing country (seller), and the other being in high demand for crude oil, making it the oil-consuming country (buyer). Since the participation of these two parties has been established, this means that this transaction would need bargaining to determine the terms of trading, prices, and transaction for a product or service that is tradeable, just as Islam et al. (2022a) described it as the beginning phase of

the bargaining game in their research. However, for the trade to take place, a series of activities must occur, which include the exchange of terms and conditions. Before this process, each of these countries weighs the advantage it has over the other, and this becomes its bargaining power.

The increase in global demand and consumption of crude oil, despite the rise in the price of crude oil, gives the illusion that the oil-producing country, as well as the seller, should have a higher advantage than the buyer (Khan, 2022). Also, according to research by De Dreu and Van Kleef (2004), buyers usually demand a large slice of the bargaining pie, which they usually obtain due to the nature of cooperative negotiations between buyer and seller. However, some literature has proven this illusion to be wrong due to several factors, which, for the purpose of this study, define the bargaining power of a country in the international trade of crude oil in the subsequent chapters of this research. The continuous increase in globalization has automatically led to a continuous demand for face-to-face bargaining between different parties. Irrespective of the location where the bargaining is being held or the party that makes the first move in the process, the bargaining power of countries involved in trade determines the respective benefits and outcomes of the negotiations, also extending to bilateral trade between the countries.

1.1 Aims & Objectives of the Study

The bargaining relationship between the numerous parties involved in the international trade of crude oil, that is, the oil-producing countries that export crude oil and the oil-consuming countries that import crude oil, is identified as conflictual (Vivoda, 2008). Since bargaining power is all about influencing and securing favorable terms and conditions based on the relative capacity of each of the parties in the international trade of crude oil, the bargaining power of each of the parties shifts over time due to unstable circumstances, and these also rest on a fraction of factors (which are referred to as variables in this study). Since the bargaining of crude oil will include two sovereign

countries, each of the parties has different levels of bargaining power. However, in some infrequent circumstances, both parties can share equal bargaining power, which can be due to economic strength, geographic location, or even unforeseen circumstances (Vivoda, 2011). This study intends to determine the factors that affect the bargaining power in trade between China and the five major countries it imports crude oil from.

The possession of crude oil, which is a unique resource, by OPCs and the need for the resource by OCCs creates an inequality in the level of dependence between each of the partners. This can be blindly concluded to be considered the source of power for the OPCs, through which they can influence China to achieve advantageous outcomes. However, since the OCC in the study is China, which has become a large exporter of products and even a larger importer of crude oil (Li et al., 2022), the level of dependence from these countries on China to purchase the large volumes of crude oil they possess cannot be overlooked. According to the resource dependency theory, due to the scarcity of internal resources, countries will have to rely on external resources, as their dependence is affected by the fraction of the total volume of crude oil they export. In order to enable the study to achieve it's main objective, it intends to establish the party with the highest bargaining power between China and its major crude oil trading partners. Just as China imports crude oil, it also exports products to it's major crude oil trading partners. Each of the parities, however, cannot be certain of the level of dependency of the other quantitatively. Identifying the relationship between bargaining power and the balance of trade in relation to China and the major five countries it imports crude oil from is also a focus of this study. In this case, this will enable the study to determine whether there is a balance of trade and bargaining power between China and its crude oil partners.

1.2 Research Questions

Based on the research objectives, the study seeks to find answers to the following questions:

- What factors determine the bargaining power of China and it's major crude oil trading partners?
- Which party, either buyer or seller, from the selected countries has the higher bargaining power in crude oil trade?
- What is the relationship between balance of trade and bargaining power in crude oil trade?

1.3 Contribution of the Study

The import and export of commodities do have an effect on the economies of partnering countries in trade. China has become the largest importer of crude oil from oil-producing countries over the years. However, it imports crude oil from different countries, both developed and developing, the majority of which are OPEC members. The reason why it is important to identify the bargaining power of these countries with China is that it will save them the time and resources involved in the bargaining procedures. This will save the parties the delay cost associated with the long bargaining procedures, as the extent to which the delay costs the bargaining is also in line with the demands of both parties. This is with respect to initial and counteroffers from both parties. This delay cost can also be related to profit, which can be lost during negotiation processes (Gago-Rodríguez et al., 2021). This can be simplified in the sense that during this bargaining process, if the price of crude oil increases, since the price is highly volatile, the buyer will experience some losses while the seller gains. Also, within this period, if the price of crude oil declines, the seller experiences some losses as well.

It is very significant that OPCs, which export crude oil to China, and China as well, ascertain which of them holds the higher power of bargaining. The ability for the OPCs to precisely recognize their bargaining power and that of China and appropriately implement it will guarantee that they reach an optimal outcome, and vice versa. Identifying the party with the bargaining power in their trade will also give either the OPCs or China the opportunity to employ the right strategies and obtain the best results, even when they find themselves in difficult bargaining settings.

1.4 Brief findings

The study analyzed the bargaining power between China and its five major crude oil exporting partners, which are Angola, Saudi Arabia, Russia, Iraq, and Oman, at a macro level. It found five factors to have an effect on the bargaining power of crude oil exporting countries and three factors on China's bargaining power in crude oil trade. The study found that these can be affected by energy, the importation of finished goods from China, the need for the transformation of energy sources to alternative energy sources in a bid to cut down on carbon emissions, the volume of crude oil produced by the OPCs, and the refining process of crude oil by the OPCs as well. Only one of these variables produced a positive p-value on the regression result, which was run on the MATLAB software. This showed that, statistically, the five major crude oil-producing countries that trade with China have the highest bargaining power in the trade.

With the use of the fixed effect in the regression analysis, the study also discovered that there is no relationship between the bargaining power of China and its major crude oil trading partners and the balance of trade between China and these countries.

1.5 Structure of the dissertation

This dissertation consists of six chapters in the following order: Chapter one is an introduction to the topic, presenting the aims and objectives of the study, the research questions that this study seeks to answer, the contribution of this study, and the brief findings that were made at the end of the research. Chapter two is a comprehensive literature review of other research made on the topic, like the role of crude oil in the global economy, China's trade development and demand for crude oil, some bargaining mechanisms, and the research gap that this study aims to fill. This was also done to prove that there has not been any research done on bargaining power in the crude oil trade. Chapter three is the method and data section, which comprises the bargaining strategies used in crude oil trade and China's bargaining strategies in crude oil trade. Then the study presented the methods that will be used in achieving the objectives: multipole linear regression, the assumptions made by the study, the OLS, the hypothesis testing for the regression, and a presentation of the steps for the linear regression. The chapter also presents the data required to obtain the objectives of the study, which are the panel data, the purpose of using the panel data in the study, a panel data analysis, and a presentation of the dependent and independent variables along with their economic justifications. Chapter four presents the empirical findings of the study through regression analysis. The chapter presents the descriptive statistics of the model, the correlation results for the regression, and a complete regression analysis that was run on the MATLAB software. The chapter further discussed the relationship between bargaining power and the balance of trade using the fixed effect model. The final chapter of the study focused on the discussions of the regression results, dwelling on the factors that have an effect on the bargaining power between China and it's major crude oil trading partners and the bargaining power of oil-producing countries. The chapter finally discussed the policy implications of the findings of the study.

Chapter Two: Literature Review

2.1 Introduction of the chapter

Crude oil ranks highly as one of the most essential raw materials and has been influential in the growth of economies, be it for producers or consumers (Wang et al., 2022). According to the analysis by Hakan Berument et al. (2010), in many cases, the growth in the trade for crude oil and its products by a country is in direct consonance with the growth of its economy. The importance of crude oil means it has been studied from a socioeconomic perspective, which is mainly from a geopolitical perspective and a country-specific economic development perspective.

The economic rise of China since joining the WTO in 2000 has been meteoric and has led to the demand for several raw materials, such as iron ore, agricultural products, and crude oil, due to its emergence as one of the world's biggest manufacturing hubs. After leaving the protectionist policy pre-2000 and becoming a more liberalized market as well as the major country for outsourcing all kinds of commodity production, China developed more relations with other countries, who eventually became its partners, either as export or import partners (Liu and Maughan, 2012).

The size of the country's economy and the increased demand for Chinese goods and services have led to China broadening its relations with other countries for trade and cooperation. Its economic prowess has given it reasonable bargaining power in the global economy and could be important when dealing with its top crude oil trading partners (Liu and Maughan, 2012). This study is aiming to examine if China has higher bargaining power when trading with these countries or otherwise.

2.2 Role of crude oil in global economy

The economic significance of crude oil has become so high that it is a barometer for global development for countries and regions, ever since the early days of the industrial age. Its

refined products are used for powering cars, engines, generators, and industries and factories. It is also an important component used in the manufacturing of several household items, either as a primary or secondary source (Lang & Auer, 2020). It has, in broad terms, become almost like the lifeblood of the world for development and hence acquired the nickname “black gold”.

The influence of crude oil is so significant on the global economy that volatile changes in its price affect the performance of the global economy. These oil price “shocks” could make or break the economies of some countries, especially when reacting to the global financial crisis (Wang et al., 2022). Jiménez-Rodríguez (2022) also analyzed the relationship between oil price shocks and economic growth and found that there is a positive reaction between the two when there is an increase in oil prices for oil exporters.

Samargandi et al. (2014), in their analysis, show that the value of crude oil prices for producers has made them rich and thus referred to as “oil-rich”, especially for some countries in the Middle East that have become rich economies mainly from crude oil proceeds. Their findings also indicate that financial development from the investment in crude oil has a significant impact on the economic growth of the non-oil sector. This study was based on the economy of Saudi Arabia, which is one of the largest oil-producing countries in the world, and it shows that the value of crude oil, when properly invested, can lead to the economic growth of countries.

Despite the sustained global efforts on decarbonization and the move towards renewable energy sources and alternative cleaner fuels, the demand for crude oil has been consistent and is set to increase by 6% from 2022 to 2028, according to the International Energy Agency (IEA, 2023). It was the primary fuel energy source in the US (35.3%), Europe (27.57%), OECD countries (36.37%), and the world (27.37%) in 2021 (BP, 2022). This is because crude oil, when refined, is still the cheapest energy source when compared with

other sources, although due to climate change, it remains imperative to reduce its use and improve efficiency to decrease pollution that harms the planet.

2.3 China's trade development and demand for crude oil

The economic growth of China in the last 20 years has seen it emerge as one of the world's largest importers of crude oil, importing 508 million tons of crude oil in 2021 (CNPC, 2022). Crude oil is the second-largest imported product after micro-assemblies and integrated electronic circuits. According to Chen and Sun (2021), the high demand led to the licensing and establishment of private sector-operated refineries in the country because the crude oil demand overwhelmed the capacity of the three government-owned refineries.

Trade development with other countries and cheaper labor for the manufacture of goods, either finished or unfinished, meant that China became an integral part of the world's supply chain (Lang & Auer, 2020). The number of factories increased, and the demand for energy almost exponentially led to an increase in crude oil imports. This is illustrated by the more than 100% increase—from 4.6 million barrels per day in 2010 to 10.3 million barrels per day in 2021—in crude oil imports over the past ten years (CEIC, 2022).

The demand for oil by China has become so large that it has built up national oil reserves in the country. It has developed strategic oil reserves in order to mitigate the risk involved in a global oil crisis as well as enhance national security (Chen and Sun, 2021). According to Herberg et al. (2014), China views crude oil as not just a product for the present but also for the future and has therefore positioned itself to collaborate and trade with some of the biggest oil producers, like the Khazakstan-China pipeline in 2009. Due to its economy being hinged on crude oil consumption, it also began trading in recent years with other crude oil-producing countries such as Russia and Angola in order to secure its future demand from diverse sources (Gamache et al., 2013).

2.3.1 Role of China in Crude Oil Demand and Supply Dynamics

Crude oil demand and supply have different dynamics that are affected by global macroeconomic factors such as global exchange rates and oil consumption by countries. It is also affected by geopolitics and the relations of countries, caused by the disparity in the places of high production consumption (Hao, 2023). Production is predominantly in the Middle East (31.2%) and North America (25.2%), with Africa and Eastern Europe sharing the rest of the production in smaller percentages in 2021. Meanwhile, consumption is primarily in Asia Pacific (38.1%), North America (23.7%), and Europe (14.4%), with China accounting for 57.7% of Asia Pacific consumption (BP, 2022).

China's demand for crude oil is highly significant to the extent that it is recognized as a major buyer by the Organization of the Petroleum Exporting Countries (OPEC) (Lang & Auer, 2020). This is because it buys most of its crude oil from OPEC countries, with six of its top ten trade partners coming from the international body; Saudi Arabia supplied the highest in 2021 with 17.2%, while Iraq (10.7%) and the UAE (8.8%) are third and fourth, respectively (OPEC, 2022). Russia is second with a supply of 16% and has become one of China's major crude oil suppliers in recent years.

According to the research by Yuen and Yuen (2022), geopolitical risk is a big factor to be considered for top oil exporting and importing countries. Geopolitical risks can be wars or tensions between countries that would affect demand and supply patterns, and therefore major players in the market for a product must be wary of this type of risk. This is exemplified by Russia's invasion of Ukraine and the aftermath, whereby the European Union placed sanctions and embargoes on Russian oil. This led to Russia having a surplus and needing to attract new buyers or increase supply to existing ones. China, along with India, capitalized on this to buy more from Russia at relatively cheaper and discounted prices because it is a major global importer. Conversely, crude oil imports from the United States to China have regressed due to geopolitical trade tensions between the countries.

China's influence comes mainly from the demand side of the crude oil market dynamics because its demand is high and suppliers are willing to sell. Yuen and Yuen (2022) found that the effects of geopolitical risks from Russia, the United States, Saudi Arabia, and China can affect oil prices. From the aforementioned countries, all are exporters except China, which further proves how integral it is to the dynamics of the crude oil market.

2.4 Balance of trade and the crude oil market

Some of the research on balance of trade and its relationship with the crude oil market has focused on a country's overall trade balance and how it affects its oil demand, and vice versa. The analysis by Kilian et al. (2009) focused on oil demand and supply relative to a country's external trade balance, including the non-oil trade balance. Major exporters and importers were studied, and the conclusions reached on major oil importers, including China, are that oil supply shocks will cause an immediate oil deficit, but this will be short-lived and, according to the research, statistically insignificant, as well as a surplus in the non-oil trade balance. In the case of an oil demand shock, there will be a significant and more permanent oil trade deficit.

In the research by Baek and Yoon (2023), which does an analysis of the relationship of China's trade balance with its three largest trade partners in the case of oil price shocks, The article points out the fact that China is highly dependent on foreign trade and crude oil and therefore will be vulnerable to fluctuations in oil prices. When there are oil supply shocks, the trade balance of China with its selected trade partners is highly significant; when the supply shock is positive, China's trade balance is positive, and when it is negative, the trade balance is also negative. When there are shocks in oil-specific demand, China's trade balance is positive for a long duration with all partners, and this can be attributed to the fact that the demand for some of the Chinese products by all of these countries is inelastic.

2.5 Bargaining mechanisms

Defined as the exchange of communications or commodities between two or more parties with the same interests to reach common terms with mutual goals, bargaining provides the parties the opportunity to share scarce resources through competitive approaches for the maximization of their outcomes (Steinel & Harinck, 2020). In every bargaining situation, the representation of the gains differs. In trade, buyers and sellers' bargain over money and commodities, countries bargain over trade agreement terms, labor unions bargain over fair wages, and many more. Various paradigms have been applied in relation to the way negotiations are done and the behavior of the parties in negotiations, and these include the approach through game theories. However, in every bargaining process, no matter the factors involved, bargaining procedures arise because of asymmetric information.

The prisoners' dilemma, which was originally conceived by American mathematicians Merrill Meek Floods and Melvin Dresher, is about two prisoners who have committed the same crime being interrogated by the police at different times and in different rooms due to a lack of evidence. This was done for the sole purpose of having either of them betray the other, that is, cooperating with the police and walking away free, but they also had the option of remaining silent and walking away free. Each of the prisoners did not know whether the other had implicated him or was staying silent. When linked to the perspective of the players in a bargaining situation, it correlates with any conflicts of interest both players might have in either cooperating or defection (Mantas et al., 2022). The "take-it-or-leave-it" game, the "ultimatum Game" and the "disagreement value" are also games that predict the sequential behavior of parties in bargaining (Yang et al., 2000).

In a market environment, two players exist, a buyer and a seller, with the intention of exchanging commodities in the form of products or services in exchange for money. The bargaining mechanisms used in this particular environment are quite different from those described in the paragraphs above. Just as in any bargaining situation, both parties

negotiate the price and nature of the transaction with the intention of reaching an agreement that is favorable for all. However, the buyer is able to exploit some asymmetries in the relationship with the seller, as one thing the buyer is sure of is that the seller has no intentions of leaving the market with its commodities, and this gives the buyer the 'buyer power' (Butovitsch, 2016). In their research, Islam et al. (2022) mentioned that in the process of bargaining, if any of the parties, that is, the buyer or the seller, enjoys monopoly power, this raises the bargaining power of that party while at the same time decreasing that of the other party. With the intention of each of the parties to raise their bargaining power in the process, bargaining mechanisms like cheap talk, take-it-or-leave-it, auctions, and sequential bargaining are used by both parties to increase their bargaining power in the process (Bounie et al., 2020).

Bargaining mechanisms employed at organization levels, such as collective bargaining, also have some differences based on the location and players involved (in this case, the labor market). In this case, bargaining is not based on the exchange of money for commodities but involves proposals for work conditions. The bargaining can begin from the side of either of the parties, that is, unions and employers or states, in relation to wages, benefits, and working conditions (Akhaukwa et al., 2013). In collective bargaining, trust is very important, as wages are also connected to the rise in prices at the macro market level. Bargaining methods used include take-it-or-leave-it, but in different forms, in the form of open clauses and derogations in arbitrations, conciliation, negotiations, and mediations (Addison, 2016).

In order for the two parties in a market to reach an agreeing point, bargaining must take place, and the ways and methods through which bargaining is done in the buying and selling of commodities differ per industry, demand and supply of the commodity in question, the environment or geographic location, and also the urgent needs of the commodity of the parties involved. The oil market has undergone many developments

over the years, which in turn have had effects on bargaining and pricing mechanisms. With an increasing number of players joining the markets, this has pushed the market into creating competitive structures as well as mechanisms used in bargaining and pricing, which correspond to the specific stage of the market. The lack of sufficient knowledge between buyers and sellers, also known as information asymmetry, marks the beginning of negotiation processes (also known as bidding processes) with respect to the oil trade.

According to Binmore et al. (1986), the players consistently and over time follow the Nash Bargaining approach during each bargaining process. One party χ makes an offer to the other party Υ to reach an agreement. When the offer is not favorable to party Υ, the offer is rejected, and an agreement is not reached at that singular stage. Any one of the following situations can follow suit: Party Υ makes a counter offer with some amendments to the offer made by party χ, or makes a completely new offer. This sets both parties for the second stage of the stage. In this stage, party χ also either accepts the counter offer made by party Υ or makes a counter offer. This then sets the negotiation process to a third stage. This process goes on continuously for several stages until an agreement is finally met, or the negotiation is terminated and both parties go their separate ways.

2.6 Conceptual framework

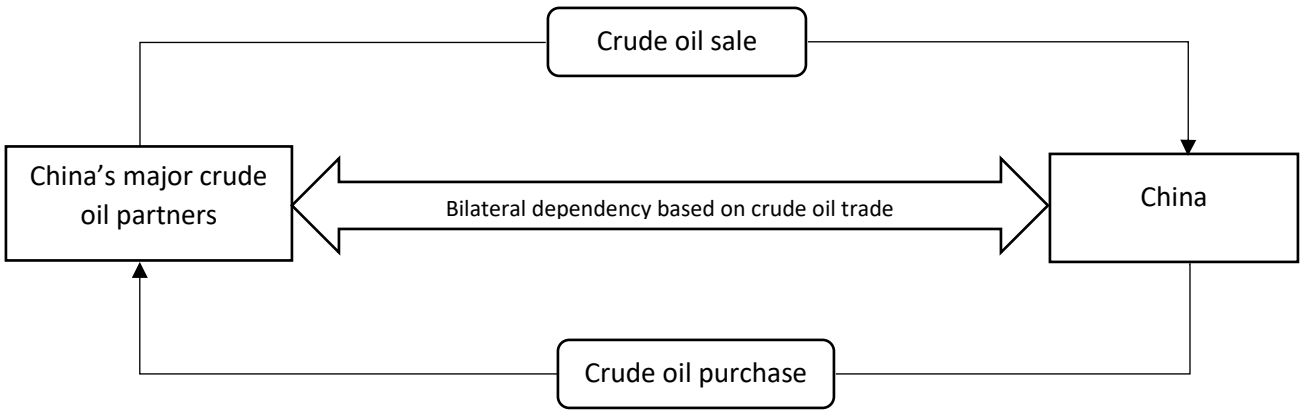


Figure 1. Conceptual framework for crude oil trade between China and OPCs

The trade relationship between China and its major crude oil exporting countries is borne first out of the basic economic dynamics of crude oil relating to both parties. From Figure 1, both countries have to trade because of demand and supply. China needs crude oil, and the countries it buys crude oil from possess and want to sell crude oil, especially to China, because it has become one of their major buyers. The second reason is due to the importance of crude oil to them; China needs to buy crude oil for its economic development, and the major crude partners also need to sell it to develop their economies.

These two reasons, combined, create a dependency between the buyer and each individual seller. As is similar with all trade between two parties who have trade relationships and knowingly depend on each other, each party will want to maximize whatever advantage it has in that trade. Normally, a buyer or seller will not want the other party to know that it is dependent on it for the trade of that product, but in this case, it is already known; therefore, the best option is to find an upper hand in negotiation via its bargaining power.

2.7 Research gaps and contributions

Bargaining power has been studied in different forms, both conceptually and contextually, with reference to concepts such as Nash bargaining and the Rubenstein method for bargaining. As regards trade of natural energy sources and bargaining power, there have been several studies on different countries, such as natural gas bargaining between the EU and Russia due to the Russia-Ukraine war (Lee & Kim, 2023). There have also been studies on China and individual countries, including the one by Azad (2023) on China's trade and bargaining dynamics with Iran. This study has the overarching objective of analyzing China's bargaining power in the crude oil market with its top partners and determining which country has the upper hand.

The contributions of the articles by Killian et al. (2009) and Baek and Yoon (2023) on balance of trade are valuable but not fully in tandem with this study's interest in balance

of trade and the crude oil market. This study aims to discover whether the balance of trade for China is significant as a bargaining chip when dealing with its top crude oil suppliers. China, in most cases, has a balance of trade surplus with other countries, and that is a bargaining chip for trade relations. However, due to its high dependence on crude oil, it needs to negotiate favorable terms with its partners.

Lastly, the study will try to examine if there is a relationship between China's balance of trade and its bargaining power in the crude oil market with its top partners. This analysis will take into consideration some macroeconomic factors that could affect both China and the crude oil-supplying countries.

Chapter Three: Method & Data

3.1 Bargaining methods in crude oil trade

The determination of the party with the bargaining advantage in the bidding process between the oil-producing country (exporter) and the oil-consuming country (importer) of crude oil remains ambiguous. This section will examine the bargaining strategies employed in the international trade of crude oil, focusing on the perspectives of two countries, the role of cartels, and the impact of government influence on the bidding process for crude oil.

In the bidding process, bilateral negotiations are the most popular means of negotiation used in the oil sector. This is the negotiation, which involves only two parties, referred to as the oil-producing country (a country with oil reserves that plays the role of a seller) and the oil-consuming country (a country that plays the role of a buyer). The seller is in possession of huge oil reserves that are above the amount of oil required for consumption in its country, and the buyer is also in possession of a huge market that is in need of crude oil. The OCC might also be in possession of the skills, technology, and resources necessary for the handling and preservation of oil and might also have the intention of becoming an oil-supplying country, as is the case in Singapore. Both parties enter into a partnership during the sales and purchase periods. At this stage, both parties possess their own special bargaining power in terms of the financial capability of the OPC, the information about each party possessed by the other, and also the extent of the effect of the oil price on the economy of the OCC. In their study on understanding the strategies that are being used by both parties, Xue et al. (2021) used game theory, which was divided into four assumptions. The first is pointing out that the players are being rational by negotiating based on their own interests; the second is pointing out the behaviors of the players based on asymmetric information; the third is on the stages of the bargaining

where prices are agreed upon to end the bidding; and the final is about the period of time it takes for negotiations to be wrapped up. The research further pointed out that the OCC is forced to yield to the demands and pricing of the OPC if it is in possession of more relevant information about them. This was also termed the information advantage parameter.

As a cartel, whose members are the major oil-producing countries in the world, thereby enjoying a large market share of more than 40%, the Organization of Petroleum Exporting Countries is able to affect the bargaining mechanisms of the oil trade, specifically with respect to pricing, by influencing the amount of oil to be produced, supplied, or stored (Pescatori & Nazer, 2022). OPEC has become the most significant player in the crude oil trade. Logically, the decisions made by OPEC in turn have an effect on the decisions made or taken by bidders, as the prices set by the organization, if high, prolong the bidding process and put the OCC at a disadvantage, and if low, also prolong the process, putting the OPC in a tight corner. With the organization setting out to regularize the price of crude oil in the market, the bidding and pricing of oil between or within partnering countries, including commercial transactions between players who are independent (oil-consuming and importing countries), is also set at the prices set by OPEC member states. This is possible as the highest oil-exporting countries are also OPEC member states. In this situation, asymmetric information plays little or no role in the bargaining mechanism, which can be used by any of the partners. In a bid to expand their coverage and have better control, OPEC also created an alliance with other oil-producing countries that are not part of the cartel's 13 member countries, with the organization being named OPEC+.

As more countries continue to discover oil and aim to become oil-supplying countries, the likelihood of large proceeds tends to have an effect on the politics of the country. Oil companies in OPCs see the need to associate with elites in the domestic markets of the OCCs or even political figures who have intersecting agendas. This is for the purpose of

increasing the relevance of their positions as exporters to the country, increasing their influence, and fostering a sustainable relationship (Pedersen, 2014). In such cases, this also puts the OPC at an advantage, or in the driving seat during negotiations, as governments in OCCs become more assertive. This situation implies that the parties use judgments to reach agreements, and trade-offs are also made. This situation requires the use of no single model in bargaining. The reasons why OPCs enter into such relationships are due to two factors. These are the political risks involved in fiscal regimes (in the case where oil companies' wish to settle in the country) and to protect their interest and position in the OCC markets, especially with the fluctuation of oil prices. In this regard, when the oil prices rise from their side, the OCCs do not resort to other OPCs since some main leaders in the country have an interest in the continuous relationship between the country and the OPC, all in expectation of relationships that will last a long time. In conclusion, the bargaining methods and the drawing of contracts are done based on the bargaining strengths of the OPC, which also depend on the interests of leaders from OCCs.

3.1.1 China's Bargaining Strategies in crude oil trade

Since international business or transactions involve dealing with people from different backgrounds and cultures, the ways and methods through which business deals are sealed also vary per continent, country, and even people with different bargaining and negotiation styles. The Chinese are well known for their tactical bargaining skills. Doing thorough research on their partner is the first traditional move in all their business transactions, be they local or international. The "Ping Pong" Model is a popular Chinese bargaining method that includes several stages, which are also defined as pre-negotiation (which includes building trust), formal negotiation (which includes the exchange of information and an agreement), and post-negotiation periods (which include new rounds of negotiation and the implementation of the agreement), which highlight the back-and-forth bargaining

feature continuously (Mattgard & Astrom, 2005). Their negotiations are also guided by the six basic values of Confucianism.

China has also developed a new strategy where it trades in oil with its borrowers, also known as 'loans for oil'. China loans or pledges to loan huge amounts of money to the borrowing country, where it later takes over a large percentage of their oil exports. According to Schneyer and Perez (2013), the oil-rich OPEC nation, Ecuador, granted China state-controlled firms about 85% of their oil for export. This was also with a $9 billion loan pledge from China. In this same situation are Angola, Venezuela, and Nigeria, which are also paying their debts worth $30 billion and $50 billion with oil (George & Zhdannikov, 2016).

3.2 Multiple linear regression

A multiple linear regression is used to study the relationship between two statistical variables, known as the χ variables and ϒ variables (Uyanık & Güler, 2013). In a regression analysis, the variable (χ), or variables (χ_1, χ_2, χ_3, …. χ_k), whose movements can cause changes or have an effect on the variable which is a constant (ϒ), are investigated and finally identified (Ali & Younas, 2021).

The following is the formula for a normal multiple linear regression:

ϒ = α + $\beta_t\chi_t$ + $\beta_t\chi_t$ + …….. + $\beta_n\chi_n$ + U

Where:

ϒ = The dependent variable

α = This represents Alpha, which is also the value of ϒ, when χ becomes zero.

β = which represents the change in the ϒ variable, against the χ variable/variables.

τ = indicated the number of observations, where n denotes the last observation.

U = The error term or residual of the regression.

3.2.1 Assumptions

In order to generate accurate results from the ordinary least squared estimator, the following key assumptions need to be fulfilled;

I. The relationship between the Υ variable (also the response variable) and the χ variable (also known as the regressors) are approximately linear.
II. The error term has constant variance, Var ($\mathcal{U}_t$) = σ^2
III. The error term has a mean of zero, E($\mathcal{u}_t$) = 0.
IV. The errors in the model are assumed to be normally distributed, $e_i \sim$N (0, σ^2).
V. There is no perfect multicollinearity between the independent variables, Cov ($\mathcal{U}_t$,$\mathcal{U}_t$) = 0.

3.2.2 Ordinary Least Squares.

The ordinary least square is the statistical method which will be used to estimate the coefficients of the regression. It is a procedure which builds a *line of best fit* to represent the spread of the data points in a straight line, in the most accurate way (Burton, 2021). Its main purpose is to minimize the summation of residual squares by calculating the vector of least square estimates (β). According to Rosenblad (2020), the role of the OLS estimator is very significant, as it also provides linear unbiased result where biased data is a reality.

The summation of the squares of the residual is minimized by the β formula below;

$\hat{\beta} = (\mathrm{X}^t\mathrm{X})^{-1}\mathrm{X}^t\Upsilon$

3.2.3 Hypothesis Testing

It is important to note that econometric tests conducted on regression models are based on one of hypothesis, which go together, known as the null hypothesis and the alternate hypothesis, which are denoted as H_θ and H_1, respectively. A null hypothesis is the first statement being tested, with the remaining outcome being the alternate hypothesis.

The hypothesis test is conducted by either the test of significance approach or the confidence interval approach. This study is interested in testing the following assumptions;

I. H_θ: China has the bargaining power in its trade in crude oil.
II. H_1 : China's major crude oil trading partners have the bargaining power.

The P-value, a number, is also another form of measurement for the probability of acquiring the observed results in the hypothesis testing. In the regression model analysis, the lower the P-value, the greater the statistical significance of the observed difference. With reference to the assumption mentioned above, a P-value of 0.5 or lower will be considered significant, statistically. The value helps in maintaining or rejecting the null hypothesis in the study. The following is the formula for the P-value;

$\rho = P\ (F > X/H_0)$

Where X is a random variable with F distribution. In the hypothesis testing, H_0 will be accepted if the P-value is greater than α, which is a significance level defined in the study. In the case of this study, $\alpha = 0.05$.

MATLAB software will be used in running the regression. This will be possible due to the built-in regression function in the software, which takes in the dependent and

independent variables, and produces an output of regression coefficients by fitting a line to the data. These can be achieved through the following procedures;

I. Dependent variables and justifiable independent variables will be collected, cleaned, and arranged on an excel format, then finally changed to the logarithm form. This file will be uploaded onto the MATLAB software.
II. A MATLAB regression function or codes for the different necessary tests will be created using the correct syntax.
III. The MATLAB software is then able to generate an output for the results.

The different algorithms host by the software is able to use and operate on large matrices in an intelligent way which is conserved on both computer memory and time.

3.2.4 Steps for the OLS Regression

- Descriptive statistics – Descriptive statistics are used in the regression model to give a general summary of a selected sample in the form of quantitative measures like means, percentage or visual summaries such as graphs, scatter plot and histograms or even correlation. According to Kaliyadan and Kulkarni (2019), the purpose of the statistical procedure is to display trends or patterns in the data for the purpose of interpretation or to tell a story. Descriptive statistics is measured statistically in the form of
    i. Central tendency, which located the center of the data set through the mean and median, which portrays the location where most values fall.
    ii. Dispersion, which showed the extent to which the data is away from the center. This is identified through the use of the standard deviation or the range deviation. These are measured in the form of low dispersion and high dispersion, which indicate that the values group tightly around or further away from the center, respectively.

iii. Skewness, portrays how skewed or symmetric the distribution of the values is.

- Test for correlation – This test is significant in measuring the degree of linear association between two or more quantitative variables. The correlation test in the regression is able to identify the strength of the linear relationship, meaning that at least, one of the variables is highly correlated with the other variables. The purpose of conducting a correlation test is to prevent the situation where there are poor estimates of the βs, vulnerability to influential factors and large standard errors. The widely used method of managing correlation is by the removal of one or any of the affected variables from the data set (Phillips & Harvey, 1974). The correlation coefficients can be calculated with the equation below;

$$r \frac{\sum(X - \bar{X})(y - \bar{y})}{\sqrt{[\sum(X - \bar{X})^2 (y - \bar{y})^2]}}$$

Where X represents the independent variables (in the case of the study, factors which have an influence on the importation of crude oil by China), and y representing the dependent variables (in the case of the study, the bargaining power between five major countries and China in crude oil trade, and the bargaining power between China and the five major countries with respect to the importation of products to their countries).

- T-test – The t-test is an important element in the regression analysis. It is essential in determining the statistical significance of the any particular variable used in the analysis, as this is also an estimation of the βs values. This is very significant as a statistically significant variable which is strongly connected to the dependent variable contributes immensely to the accuracy of the model. The test is further performed to check for significance in the in the regression slope, and the following null and alternative hypothesis is used for the t-test;
    - $H_0 : \beta_1 = 0$ (slope = 0)

- $H_1 : \beta_1 \neq 0$ (slope $\neq 0$)

However, in any proper regression model, data is necessary to serve the role of a theory. Since the study will be using a multiple linear regression model, two dependent variables (ϒ) will be used in the study with multiple independent variables (χ). The study will be analyzing the bargaining power between five major crude oil producing countries which export crude oil to China and the bargaining power between China and the sample countries.

3.3 Data

In order to determine the bargaining power between China and OPCs in the international trade of crude oil, this study utilized secondary data from UNCOMTRADE, British Petroleum Statistics and Clarkson's Intelligence Network. The sample included the top five countries which export crude oil to China, which was also determined based on the total number of exports made by these countries to China. The time period of the data collected will be from 1995 to 2021, a period of twenty-six years, which resulted to two thousand, seven hundred (2,700) units of data. This study chose to use a long time period because during these periods, the position of the countries, as top five countries which export crude oil to China, is not constant. This is a normal behavior for countries in international trade as trade openness, industrialization, higher technology which contributes to future economic growth, and many more, affect the choice of partnership in international trade (IMF, 2011).

The regression included two dependent variables, the bargaining power of China's major crude oil exporting countries to China and the bargaining power of China to it's major crude oil exporting countries with respect to the total volume of crude oil they export globally. The study also included fourteen independent variables, which were assumed to

be statistically significant to the dependent variables mentioned above as follows, China's consumption of crude oil (in volume), China's energy consumption (in volume), alternative energy consumption By China (in volume), export of refined oil by China (in volume), population growth in China (in size), industrial production in China (in size), import of Chinese products by crude oil exporting countries (in volume), crude oil production rate in exporting countries (in volume), energy consumption for crude oil exporting countries (in volume), foreign direct investment by China in crude oil exporting countries (in size), crude oil refining in exporting countries (in volume), global crude oil prices (in US Dollars), global crude oil supply rate (in volume) and global crude oil demean (in volume). All the data collected on the independent variables mentioned above will be converted into log form for a better interpretation. Each of the independent variables were carefully chosen and have been justified below for the purpose of the study.

A Microsoft Excel sheet was used for the collection, arrangement and cleaning of data from the data collection sites mentioned in the paragraph above.

3.3.1 Panel Data

A panel data, which is a dataset collected at different points in over long periods of time, was used for the purpose of this study. The panel analysis was analyzed using cross-sectional and longitudinal (two-dimensional) data to be run over a regression. It was used to determine the bargaining power between five major crude oil producing countries which export crude oil to China and the bargaining power between China and the major crude oil producing countries with respect to the total volume of crude oil exported globally. This was achieved through the three types of longitudinal data, which are:

I. **Time Series Data** – These are data collected over a period of time of one or more variables. Time series data are characterized by a particular frequency of observations like daily, monthly, and annual data.
II. **Pooled Cross-Sections** – The pooled cross section combines all the cross-sectional data which has been collected over a period of time. One significant

property of the pooled cross sections data is that, the more the observations, the more refined the accuracy of econometric estimates will be. The more time elements in the data collected, also allows for better outcome of how the Υ variable responds to the χ variables as they change over time (Raimundo et al., 2018).

III. **Panel Data** – The panel data has a dimension of both the time series data and the cross-sectional data.

3.3.2 Purpose of Using a Panel Data in The Study

Considering the fact that the study will be using a large number of data which was used in the study, it considered that the data might contain some inaccurate data and experience of endogenous variables, and which would affect the consistency of the regression. This is normal for large number of variables, as it is difficult to identify all the necessary variables for the study, and also difficult to obtain all the data in the same frequency, in a complete form of the required structure. Landstrom (2019), mentioned that in the process of research, researchers are unable to identify all the independent variables which correlate with all the factors being studied. The regression models thus, able to omit these variables which also becomes a potential problem for the model. The panel data is able to solve this problem by sweeping away the possible effects of the omitted variables and discovering a consistent regression estimate, if the omitted variable is either cross-sectionally constant or time constant.

3.3.3 Panel Data Analysis

The following is the formula for a panel data analysis

$$\gamma_{it} = \chi_{it}\,\beta + \alpha_i + \upsilon_{it}$$

Where:

γ = the dependent variable

i = the number of the units observed, thus 1, 2……., N

t = the number of periods, thus 1, 2……., t

χ_{it} = is the change in independent variable i against independent variable j.

For the purpose of this study, the following formula was considered as an empirical representation of the panel data analysis. Considering the fact that the study will run the regression based on two dependent variables, the model will be run twice, once for each of the dependent variables, with the i and j units changing positions where the bargaining power between five major crude oil producing countries which export crude oil to China, which will be represented by unit i to unit j, may be different from that of the bargaining power between China and the major crude oil producing countries with respect to the total volume of crude oil the OPCs export globally represented by unit j to unit i.

Thus:

$\gamma_{it} = \chi_{it}\,\beta + \alpha_i + \upsilon_{it}$

$\gamma_{it} = \chi_{it}\,\beta + \alpha_i + \upsilon_{it}$

The formula above was utilized after quantifying the statistical significance of the independent variables to the dependent variable, and establishing the non-correlation of the variables to each other for the regression model.

After the panel data regression has been run, the study will use the following formula to determine the bargaining power between China and its trading partners in crude oil import

and export. The party with the bargaining power will be determined as affected by the factors mentioned above.

$$BP_{C-N} = \frac{volume\ of\ crude\ oil\ imports\ from\ country\ N\ to\ China}{Total\ volume\ of\ crude\ oil\ imports\ by\ China}$$

$$BP_{N-C} = \frac{volume\ of\ crude\ oil\ export\ from\ country\ N\ to\ China}{Total\ volume\ of\ crude\ oil\ export\ from\ country\ N\ to\ the\ world}$$

With reference to the bargaining power formula above, the study assumes that the bargaining power between China and its crude oil trading partners can be determined by the volume of trade in crude oil by both parties. China has become a large importer of crude oil due to the large demand of its local and international market, thus the total volume of crude oil imports from each of the countries might have an effect on the bargaining power of any of the parties (Li et al., 2022). On the other hand, China's crude oil trading partners also have a total volume of crude oil which is exported to the world. The study assumes that the proportion of this total volume of crude oil which is exported to China, will determine how much the OPC relies on China more than any other country in the world, for the purchase of it's large crude volume of crude oil. China might have an upper hand in the bargaining procedure, as a significant amount of the OPC's economic growth would depend on China.

3.4 Dependent variables

This dissertation analyzed how different factors affect the bargaining power between China to it's major crude oil trading partners and the bargaining power of OPCs to China. All economic variables chosen for the study were based on studied articles related to this

study and were mentioned to be influential in determining the bargaining power in crude oil trade between countries.

These were also based on variables which the authors found relevant in determining bargaining power as well. This was because the study assumed that the more China is dependent on any of these countries for it's supply of crude oil, the less China is able to determine the terms and pricing in their agreements, and vice versa (Stiller, 2023). This then reduces the bargaining power of China. The study also assumed that the more the countries which export major crude oil to China depend on China to purchase a large volume of the total volume of crude oil it exports to the world, the less their bargaining power in the trade between them and China, and vice versa.

A thorough data mining was done on countries which export crude oil to China for a twenty-six-year window, from 1995 to 2021. During the data mining, the research found out that China's trading partners in crude oil trade have not remained constant over the necessary time period, as mentioned above, this is one of the purposes of using the panel data. The countries used in the study, based on the volume of crude oil they export to China are Angola, Iraq, Oman, Russia and Saudi Arabia, (UN_COMTRADE). On running the model, each of the observation was be based on the covariates on each of the sample countries and China. This resulted to one hundred and thirty-five (135) observations.

3.4.1 Economic justification of independent variables

The following were assumed to be factors which affect bargaining power in the international trade of crude oil between China and countries which are top five oil exporting countries to China:

China's oil consumption (volume)

The consumption of oil by China dictates the volume of crude oil it will need to import and refine to meet its demand. If this demand is high, it means it will depend more on the

crude oil supplying countries and it will depend less on them when the demand is low. This change in the demand for oil consumption for energy, manufacturing or other uses can have an impact on China's bargaining position when importing crude oil. Even though there are other factors involved, the consumption rate is a high indicator of who has the higher bargaining power between China and its crude oil suppliers.

China's energy consumption

Oil makes a fraction of the energy sources in China and has reduced as an energy source in recent years. It made up 22% of the energy sources in 2000 and has made up an average of 18% between 2010 and 2022 (BP, 2022). Despite not being one of the major energy sources in the country, oil makes up part of these sources and an increase in energy consumption will lead to an increase in oil demand for energy use and vice versa. This increase or decrease could dictate how China trades in the crude oil market depending on the degree of increase or decrease, which could make it more or less willing to buy.

Alternative energy consumption by China

The drive towards decarbonization has seen countries diversify gradually away from fossil fuels and have been adopting alternative renewable energy in order to combat climate change, and China has been following developing its decarbonization measures with the intention of being a leader in this campaign (Herberg et al., 2014). This includes moving away from fossil fuels such as coal and oil for energy consumption, in local transport and energy generation. This has led to the increase in the number of electric cars and renewable energy sources for electricity which include wind, solar, biofuels and other renewables. The more China diversifies away from fossil fuels as a major importer of crude oil means its partners will try to get it to buy more which improves its bargaining power.

Export of refined oil by China

China is one of the biggest importers and consumers of crude oil with its rank between first and second interchanging with the United States, as well as the country with the second highest crude oil refining capacity in the world, after the United States. It refines fuel for its local consumption and exports a considerable amount to other countries. In 2022, China was the ninth largest refined oil exporter in the world (OEC 2022). The amount of refined oil China exports is significant to the total amount of crude oil it exports and will impact its demand. This demand by China will also be influenced by the demand of refined oil by the countries it trades with in this market such as Singapore, Hong Kong, Philippines, Liberia, and Panama (Gamache et al., 2013). When China has the need to export more refined fuel, this will affect how it bargains when importing crude and due to economic complexities when it needs to reduce refining, this will also affect its bargaining strategy.

Population growth in China

Population studies have posited that the growth in population could be positive or negative given the circumstances and the area of the growth. When population growth coincides with economic development it means the urban areas will experience more growth and that will also lead to rural-urban migration. This scenario will lead to an increase in demand for basic and luxury goods, with energy among the former. In a situation where China experiences this form of population growth, its demand for energy will inadvertently grow and increase imports of all energy sources including crude oil. Conversely, the reverse could be the case when population is in decline. These changes will affect China's bargaining power in the crude oil market.

Industrial production in China

China is a highly industrial nation due to the wide array of manufacturing and industrial activities carried out which keeps expanding and growing on a yearly basis, especially since 2000 (Gamache et al., 2013). These activities require a lot of energy including crude oil which as both a source of energy and a component for production of various goods.

Manufacturing has become an integral part of China's GDP and had a share of 27% in 2021 (OEC 2022). Its importance to the Chinese economy alongside other industrial activities makes China demand for crude oil consistent and ever rising, which means it could lose its bargaining power because of the high dependence on crude oil to improve its economy.

Import of Chinese products by crude oil exporting countries

Due to its critical position in the global supply chain and high rate of manufacturing activities, China has become the world's top exporting country, selling goods and services to most countries, including those it imports crude oil from (Liu and Maughan, 2012). There is bargaining at play here when making bilateral agreements in order to maximize each country's comparative advantage, whereby the trade of crude oil to China is set against the import of other goods from China. This will affect which country has the higher bargaining power in both scenarios based on the dependency level on the other country. Additionally, the balance of trade between China and any of these countries is a factor, because the country with the higher trade balance has an advantage due to the other country depending more on its goods and services.

Crude oil production rate in exporting countries

All things being equal, demand and supply dynamics depend firstly on the availability of a product, or the fluctuation in its volume or amount. This could affect the price with the buying country looking for alternatives based on what is on offer. If there is an increase in the supply of crude oil by the producing countries, they would prefer to sell quickly to get rid of inventory and sell as much as possible, and the reverse is the case when production levels are low. In the former, these countries could lose their bargaining power because of dependence on the buyer (China) to buy as much as possible, while in the later, due to inelastic demand by China and a short in supply, it could lose its bargaining power.

Energy consumption of crude oil exporting countries

Crude oil exporting countries generate a lot of revenue from selling crude oil but also reserve for their own energy consumption. When this energy demand in the countries increase, the amount needed for consumption will increase and the amount sold to other countries including China will decrease. This situation will affect China because it has to fulfill its demand by trying to marginally increase its supply from these countries by offering a higher price or by looking for alternatives from other countries.

Foreign Direct Investment by China in crude oil exporting countries

China has recently become the third largest investor in other countries through Foreign Direct Investments (FDI) (UNCTAD, 2022). It has been investing in both developed and developing countries in varying degrees and methods. In the former, it buys bonds or enter into bilateral agreements for development of mutual investment opportunities and for the latter it invests in infrastructure development mostly in the transport sector, such as ports and railways (Buckley, 2009). This investment becomes a bargaining chip for countries it has bilateral agreements with, in this case sale and purchase of crude oil. A high investment could mean the country will feel it should have favorable terms of trade with China on crude oil sale and a decreasing FDI could have a negative effect.

Crude oil refining in exporting countries

Crude oil exporting countries are broadly in two categories: those that sell as a major source of revenue and refines very little such as Nigeria and Angola, and those that sell but refine for their consumption and even for export to other countries such as Saudi Arabia and Russia (Samargandi et al., 2014). China therefore has to be wary of its partners that refine crude oil and if that volume is rising, which will mean the volume of crude oil for export will be reduced. In this scenario, China will lose its bargaining power due to the need to fulfill its crude oil demand.

Global crude oil prices

In recent years, China's demand for crude oil has been close to being inelastic, meaning the price of the product does not really affect demand. But in the case where the price

change becomes beyond marginal, even China will have to rethink how to structure its demand and how to have an advantage in the crude oil market. An abrupt and significant change in the price of crude oil will affect which country has the higher bargaining power between China and the exporting countries.

Global crude oil supply rate

The countries in the Organization of the Petroleum Exporting Countries (OPEC) own around 80% of the world's crude oil reserves (OPEC, 2022), and therefore have an influence on price and global supply rate. Apart from Russia, China acquires most of its crude oil from OPEC member countries, whose supply could get higher or lower in based on the increase or decrease of oil reserves and the rate of oil drilling. These factors could also affect the supply from Russia. The level of supply, whether high or low, will affect both buyers and sellers and how they negotiate.

Global crude oil demand

Crude oil is the major source of energy for all types of activities and the world is dependent on its production for development of economies and sustenance of livelihood. As a result, there is a high demand for it and for many countries it is inelastic. For any country that is highly dependent on crude oil, it is pertinent for it to be aware of the global aggregate demand for crude oil and how it will affect its own demand. This is especially more important in the case where the global demand is higher than global supply or when other countries are prepared to pay a bit more to make sure they meet their demand. The increase in global demand will mean China could be affected and thereby losing its bargaining power while a decrease could have an opposing effect.

Chapter Four: Empirical Findings

4.1 Introduction

The aim of this chapter is to present the results from the linear regression models for a better understanding of the bargaining power between China and it's five major crude oil exporting partners. The chapter will give an orderly description of all the results based on each of the steps according to precedence, significance and the effect they would have on the following step.

For a better analysis of the regression, as mentioned in the previous chapter, Microsoft excel was used in the arrangement of the data. It was further used to conduct the descriptive statistics and the test for correlation for the data available. The data which was collected for the study was arranged on an excel workbook, and in the values or forms through which they were achieved. Also, for the purpose of easing the identification of the variables on the MATLAB Software, all the dependent and independent variables were given numerical identifications, with the notation Υ preceding the numbers 1 and 2 for the dependent variables and the notation χ preceding the independent variables, from 1 to 14. This is shown on the table below:

Table 1: Notation of regression variables

Notations	Dependent/Independent Variables
Y1	Bargaining power between Country N and China
Y2	Bargaining power between China and country N
X1	China's oil consumption
X2	China's energy consumption
X3	Alternative energy consumption of China
X4	Export of refined oil by China

X5	Population growth of China
X6	Industrial production of China
X7	Import of Chinese products by major crude oil exporting countries
X8	Crude oil production rates in major exporting countries
X9	Energy consumption by major crude oil exporting countries
X10	Foreign Direct investment by China in major crude oil exporting countries
X11	Crude oil refining in major crude oil exporting countries
X12	Global crude oil prices
X13	Global crude oil supply rate
X14	Global crude oil demand

The following are the tests and analysis conducted on Microsoft excel workbook.

4.2 Descriptive statistics

Table 2: Descriptive statistics

VARIABLES	MEAN	MEDIAN	STD DEVIATION	SKEWNESS	Count
Y1	0.21123	0.143	0.204386265	1.051471991	135
Y2	0.097444	0.093	0.058543091	0.225349924	135
X1	17.08407509	15.86912973	7.343512647	0.256038787	135
X2	90.98870812	93.66840582	39.82870554	-0.010626027	135
X3	2.04074927	0.364823697	3.031813173	1.666701007	135
X4	581.7052483	421.32619	416.4680424	0.783207291	135
X5	9.120884039	9.122102783	0.020543507	-0.258369416	135
X6	10.9787037	11.38333	4.123932112	-0.182879063	135

X7	9.206907474	9.331973307	1.039300461	-0.825892651	135
X8	3.449927565	3.413916728	0.447573291	-0.034358947	135
X9	7.568524544	1.37097306	10.65023219	1.279958542	135
X10	380.028963	22.5	739.5131673	2.23887407	135
X11	2.671769808	2.678986433	0.753873342	-0.098991946	135
X12	65.88497724	57.21931997	32.36035739	0.552068568	135
X13	4.602420977	4.611449808	0.034297333	-0.641882353	135
X14	4.930139696	4.9353249	0.04580143	-0.235724942	135

Due to the small values of the standard deviation, it is shown on table 2 that the data points tend to be close to the mean values of the data set. This further shows the diversity of the data set being used in the study. Also, from table 2, it is shown that a small number of the data is highly skewed, that is just 3 out of 16 variables (combination of the dependent and independent variables). For the purpose of have a normal data set with little or no skewedness, the data was finally transformed into logarithm form.

The secondary data (variables) which were attained in numerical form and highly skewed was changed into logarithm form to attain a normalized dataset. Once some of the variables undergo a log transformation, this linearizes the variables as well for further estimation following the OLS process (Kissell & Poserina, 2017, pp. 103–135). This process is necessary for the execution of the ordinary least square to fit only into the Regression model, presented below, and also for the purpose of the MATLAB Software.

$\Upsilon = \alpha + \beta_1\chi_1 + \beta_2\chi_2 + \beta_2\chi_2 + \beta_3\chi_3 + \beta_4\chi_4 + \beta_5\chi_5 + \ldots\ldots\ldots \beta_{14}\chi_{14}.$

4.3 Correlation result

A correlation test was conducted on only the fourteen (14) independent variables to determine whether there is a relationship between any two or more variables, (this also means that the correlated variables are telling the same story in the regression). The study

used a correlation threshold of 0.9, considering the large number of 135 observations. This threshold is acceptable in regression as any threshold higher than 10 is considered to be a sign of severe multicollinearity (O'brien, 2007). This indicates that any two or more variables whose magnitude is greater than 0.9 after the conduction of the test, is considered to be highly correlated. Also, the variables with 0.1 to 0.89 magnitude are considered to be moderately correlated. A correlation result, as shown on figure 2 below showed that four independent variables were highly correlated, indicating that the model has a problem with multicollinearity.

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14
X1	1													
X2	0.99	1												
X3	0.87	0.80	1											
X4	0.96	0.92	0.92	1										
X5	0.98	0.98	0.77	0.92	1									
X6	-0.52	-0.46	-0.58	-0.61	-0.47	1								
X7	0.69	0.71	0.47	0.61	0.72	-0.28	1							
X8	0.17	0.18	0.12	0.16	0.19	-0.09	0.73	1						
X9	0.09	0.09	0.07	0.08	0.08	-0.04	0.58	0.71	1					
X10	0.51	0.50	0.46	0.50	0.49	-0.37	0.46	0.42	0.16	1				
X11	0.10	0.10	0.09	0.10	0.10	-0.06	0.62	0.88	0.81	0.35	1			
X12	0.44	0.55	0.07	0.24	0.51	0.17	0.51	0.11	0.05	0.15	0.05	1		
X13	0.79	0.79	0.51	0.73	0.86	-0.25	0.64	0.17	0.07	0.35	0.08	0.51	1	
X14	0.96	0.96	0.72	0.89	0.98	-0.40	0.72	0.19	0.08	0.47	0.10	0.55	0.90	1

Figure 2: Correlation result 1

China's oil consumption was found to be correlating with Chinas energy consumption, with the export of refined oil by China, and also with population growth of China. The multicollinearity in the three variables is due to the fact that all these variables share a connection, which is that they are all influenced by environmental, economic and geopolitical factors. The study assumes that this is also as a result that the oil consumption of China is also influenced by the other three correlated covariates, as the three

aforementioned variables are just a breakdown of China's oil consumption; therefore, they tell the same story. China's energy consumption, the export of crude oil (which is also turned to refined oil for exportation), and the population growth of China make up the volume of crude oil consumed by China. With respect to the global crude oil demand, the study also assumes that China's oil consumption is a fraction of the global crude oil demand, whilst the aforementioned covariate is amongst the figure which makes up the global crude oil demand. China's main focus in the crude oil trade is to import crude oil transform it into refined oil for its own consumption and also to for the purpose of exportation.

Alternative energy consumption was also found to be correlating with the export of refined oil by China and with population growth in China. This is because their relationship has the same effects on international trade. Ilechukwu and Lahiri (2022), found that inter alia, a 1% increase in the utilization of alternative energy, like the likes of renewable energy leads to a 1,026% decrease in the exportation of the country. Thereby, if China and the countries it exports crude oil to decide to switch to the use of alternative energy, the demand for crude oil by China will definitely decrease, and if the demand decreases, then China will not be exporting much of crude oil like it used to, and this will drastically decrease until it will no longer export crude oil

Population growth of China was also found to be correlating with the global crude oil demand because the growth in population of different nations, especially large crude oil importers like China has a direct effect on the global crude oil demand. It is more like the same outcome because the more the population grows, the more the demand of crude oil rises. This does not need any testing as it is a constant phenomenon.

After completion of the test assumptions being made, an improvement in the model was necessary in terms of multicollinearity. The independent variables which were found to be highly correlated were finally removed. The study, in order not to have a repetition of covariates having the same effect on the dependent variables, removed China's oil

consumption, the export of refined oil by China, population growth of China and the global crude oil demand.

	X2	X3	X6	X7	X8	X9	X10	X11	X12	X13
X2	1									
X3	0.80	1.00								
X6	-0.46	-0.58	1.00							
X7	0.71	0.47	-0.28	1						
X8	0.18	0.12	-0.09	0.73	1.00					
X9	0.09	0.07	-0.04	0.58	0.71	1				
X10	0.50	0.46	-0.37	0.46	0.42	0.16	1			
X11	0.10	0.09	-0.06	0.62	0.88	0.81	0.35	1		
X12	0.55	0.07	0.17	0.51	0.11	0.05	0.15	0.05	1	
X13	0.79	0.51	-0.25	0.64	0.17	0.07	0.35	0.08	0.51	1

Figure 3: Correlation result 2

After the conduction of the test of correlation, the data was finally exported to the MATLAB software to run for two of the regressions necessary for the study, this will also reduce the possibility of errors occurring in the model.

4.4 Regression analysis

Two separate regressions were run for both independent variables using MATLAB and the results are discussed below:

4.4.1 Bargaining power of China's major crude oil partners

The first section of the regression results will discuss the variables that are significant to the bargaining power of the major crude oil countries that China imports from as shown in the table below. In the final simulation of the model and to make it more robust, one of

the variables, 'global crude oil supply rate', was removed. This variable even though very important can be forgone because there are other variables that are similar and contain country specific data such as crude oil production rate in major exporting countries.

Table 3: Regression results for bargaining power of China's major crude oil partners

	Estimate	SE	tStat	pValue
(Intercept)	0.29	0.19	1.56	0.12
*China energy consumption	0.00	0.00	2.88	0.00
*Alternative energy consumption China	-0.02	0.01	-2.42	0.02
Industrial production in China	-0.01	0.00	-1.43	0.15
*Import of Chinese products by major crude oil exporting countries	0.08	0.04	2.00	0.05
*Crude oil production rate in major exporting countries	-0.20	0.08	-2.46	0.02
Energy consumption by major crude oil exporting countries	0.00	0.002	0.93	0.35
Foreign Direct Investment by China in crude oil exporting countries	0.00	0.00	-0.46	0.65
*Crude oil refining in major exporting countries	-0.11	0.04	-2.91	0.00
Global crude oil prices	-0.00	0.00	-1.39	0.17

Note: Variables marked with * were found to be significant (pValue < 0.05)

China energy consumption

There is a positive relationship between the bargaining power of the selected countries with China's energy consumption, which means that an increase in the latter will lead to an increase in the former. This should be the case because when China needs to consume more energy, it will also need to import more crude oil, which is one of the energy sources

it requires, thereby depending more on it's crude oil trading partners. The countries have an upper hand due to this added dependence caused by China's increasing demand for crude oil and will look up to its major partners in order to meet the demand.

Alternative energy consumption in China

This relationship is negative and suggests that the more China increases it alternative energy consumption, it's crude oil-supplying countries will have a reduced bargaining power. An increase in the use of alternative or renewable energy sources such as wind and solar will lead to a reduction in China's dependence on crude oil for energy and thus reduce its demand. In turn, due to the fact that China has become the largest importer of crude oil, its's major crude oil trading partners would desire to maintain a bilateral relationship in order to maintain their revenue stream, and this dependence would decrease their bargaining power.

Import of Chinese products by major crude oil exporting countries

In geopolitical trade, countries always find ways to improve the sales of the products in which they generally have comparative advantage over other countries. For this scenario, the comparative advantage that the crude oil-supplying countries have is crude oil, and for China, it is high-level manufacturing of goods and services. This relationship is explained by the model as being positive, whereby the more countries buy from China, the higher bargaining power they have. This is because China generates a lot of its revenue and GDP from selling manufactured goods and needs countries to buy them, which can be leveraged against it due to alternatives being available.

Crude oil production rate in major exporting countries

It has been established that for all crude oil-producing countries, it is one of the major sources of revenue, and for many of them, and linked directly to their economic development. Therefore, when crude oil production is higher, oil-producing countries seek to maximize revenue and export as much as possible, which the model shows will lead to

a decrease in their bargaining power. A surge in crude oil production, especially an unprecedented one, will make the countries look to export more to their biggest partners, with China being among them. Their bargaining power will reduce because they will depend on China to increase its demand and increase the volume of its imports.

Crude oil refining in major exporting countries

There is an inverse relationship between the bargaining power of China's top crude oil partners and the level of crude oil being refined by the oil-producing countries, according to the model. This means that the more they refine crude oil, either for local consumption or for export, the less bargaining power they will have. It would be expected that these countries should have more bargaining power when they refine more because the quantity of crude oil for imports will reduce and China will want to maintain the amount it imports from them. However, the increase in refining could also mean that the reduced quantity for crude oil exports could mean China has to look for alternatives if it cannot fulfill its demand. This could affect the terms of trade on crude oil with these countries in the future and negatively affect their bargaining power.

4.4.2 China's bargaining power

The second model analyzes China's bargaining power as regards its trade of crude oil with its major partners which is shown in the table below. During the course of finalizing the model, the variable 'China's energy consumption' was removed, because crude oil is not the major energy source in China, with coal being the major source of energy (OEC, 2022). Therefore, this variable does not provide complete information on China's bargaining power.

Table 4: Regression results for China's bargaining power

	Estimate	SE	tStat	pValue
(Intercept)	-1.56	0.90	-1.74	0.09
Alternative energy consumption China	0.00	0.00	0.74	0.46
Industrial production in China	0.000	0.001	0.10	0.92
Import of Chinese products by major crude oil exporting countries	-0.01	0.01	-1.06	0.29
*Crude oil production rate in major exporting countries	0.13	0.03	4.53	0.00
Energy consumption by major crude oil exporting countries	0.00	0.00	1.82	0.07
*Foreign Direct Investment by China in crude oil exporting countries	0.00	0.00	2.08	0.04
*Crude oil refining in major exporting countries	-0.09	0.01	-5.85	0.00
Global crude oil prices	0.00	0.00	1.27	0.21
Global crude oil supply rate	0.33	0.20	1.63	0.10

Note: Variables marked with * were found to be significant (pValue < 0.05)

Crude oil production rate in major exporting countries

The production rate of crude oil in the major exporting countries has a positive relationship with China's bargaining power, which entails that the higher the production rate, the higher China's bargaining power. The increase in output will prompt the selling countries to export more to generate more revenue, and this will increase the power of the buying country, which in this case is China. The buying country (China) can, in this situation, ask for a discount or make other demands because it knows the seller desires to make more sales in order to generate more revenue.

Foreign direct investment by China in major crude oil exporting countries

An increase in foreign direct investment (FDI) by China in its major crude oil partners will reduce its bargaining power. This could play out in terms of geopolitical dependency, where the countries would take into account that China depends highly on them for crude oil and therefore is investing heavily in order to protect its crude oil trade terms. Higher FDI will mean that China has reduced bargaining power.

Crude oil refining in major exporting countries

Countries that sell crude oil can increase the percentage of the amount they refine due to economic reasons, and this will affect the buyers. The model shows that when this happens, China loses its bargaining power because the quantity of crude oil it imports will be reduced. In a bid to maintain this, it might have to make compromises in trade negotiations in order to meet its demand.

4.5 Relationship between bargaining power and balance of trade – the fixed effect model

The fixed effect model in panel regression is the process whereby some of the model's parameters or variables are fixed in order to reduce randomness (Imai, 2021). For the purpose of the regression analysis run on MATLAB, the fixed effect was applied to the countries, with the first country in alphabetical order, thereby making Angola the 'intercept'. This version of the model showed the level of relationship between each dependent variable and the countries. This relationship is also statistically represented by the pValues, where a lower pValue denotes a close relationship between the dependent variable and the country, while a higher pValue means the statistical relationship is not close. These values were ranked in order of smallest to highest in order to determine the order of the relationship between the countries and the two dependent variables, which are

the bargaining power of China's major crude oil partners and China's bargaining power in crude oil trade with its top partners.

The average balance of trade for China with its major crude oil partners was also calculated for the years 1995-2020. In order to establish the relationship between bargaining power and the balance of trade, a comparison of the regression result after applying the fixed effect was made with the balance of trade. To make the comparison, the pValues were ranked in ascending order, while the balance of trade was ranked in descending order, with an evaluation of each country's rank. This is because for the pValue, the lowest value means a higher relationship between the dependent variables and the countries, while for the balance of trade with China, the highest value entails a higher balance of trade for that country compared to the other countries. That is to say, after this order has been determined, if the top country in the regression result (lowest pValue) also has the highest balance of trade with China, then there is a positive relationship between the dependent variables (the bargaining power of China or its major crude oil partners) and balance of trade, while the opposite will mean a negative relationship. This analysis is described using the tables below:

Table 5: Fixed effect results for bargaining power of China's major crude oil partners and balance of trade

Country	pValue	Country	Trade balance with China $ (1995-2020)
Iraq	0.026	Russia	-785660.58
Angola	0.032	Iraq	-3593369.9
Saudi Arabia	0.081	Oman	-7898610.61
Russia	0.299	Angola	-11464474.3
Oman	0.500	Saudi Arabia	-12580308.67

Note: pValues (fixed effect) are in ascending order while balance of trade is in descending order

The figures presented on table 5 show the results of the fixed effect for the bargaining power of China's major crude oil partners and the cumulative balance of trade between China and these countries (1995-2020), the former arranged in ascending order, while the latter is in descending order. To have a perfect relationship between China's bargaining power and China's balance of trade with the countries, all countries on both tables must be in the same order for both parameters. None of the countries used for the study meets this requirement, which signifies that there is no relationship between the bargaining power of China's major crude oil partners and their balance of with China.

Table 6: Fixed effect results for China's bargaining power and balance of trade

Country	pValue	Country	Trade balance with China $ (1995-2020)
Oman	0.000	Russia	-785660.58
Russia	0.003	Iraq	-3593369.9
Angola	0.075	Oman	-7898610.61
Saudi Arabia	0.231	Angola	-11464474.3
Iraq	0.351	Saudi Arabia	-12580308.67

Note: pValues (fixed effect) are in ascending order while balance of trade is in descending order

Table 6 show the results of the fixed effect for China's bargaining power and the cumulative balance of trade between China and its major crude oil trading partners (1995-2020), with the former arranged in ascending order, while the latter is in descending order. The table illustrates that there is no parity between the balance of trade of the countries with China and the results from the fixed effect of the regression for China's bargaining power.

Table 7: Comparison of pValue (fixed effect) and balance of trade for both dependent variables

Bargaining power of China's major crude oil partners			**China's bargaining power in crude oil trade**		
Country	**pValue rank**	**Balance of trade rank**	**Country**	**pValue rank**	**Balance of trade rank**
Angola	2	4	Angola	3	4
Iraq	1	2	Iraq	5	2
Oman	5	3	Oman	1	3
Russia	4	1	Russia	2	1
Saudi Arabia	3	5	Saudi Arabia	4	5

Note: pValue (fixed effect) rank and balance of trade rank are derived from tables 5 & 6

The figures on table 7 show the pValue and balance of trade rank for each country. This is shown on the table for both dependent variables, the bargaining power of China's major crude oil partners and Chinas' bargaining power. It can be observed that there is no similarity for the rank of each country when balance of trade and fixed effect pValues are compared. This summarily means that, based on this model, there is no relationship between balance of trade and bargaining power for both China and its major crude oil partners.

Chapter Five: Discussions and Limitations of the Study

5.1 Discussions

China is one of the largest importers and consumers of crude oil, which is the reason for several studies on its crude oil trade and utilization. This study takes another approach, which is to examine the bargaining power it has and that of its top five crude oil exporting countries from 1995 to 2021, which are Angola, Iraq, Oman, Russia, and Saudi Arabia. The study has made findings that are in consonance with its overarching aims and objectives, which are discussed below.

5.1.2 Factors affecting bargaining power of China and its major crude oil partners

Crude oil is a product that has both macroeconomic and microeconomic implications, even though the former is more influential and gives credence to the latter. The macroeconomic effect of crude oil lies in the fact that it is used primarily as a primary product, as a source of energy for factories and vehicles, and also as a component for the production of goods. Inadvertently, all of these products reach the final consumer, which is the microeconomic aspect of crude oil, but ultimately, it is a product that has far higher macroeconomic implications. This is why, in many situations, governments are actively involved in the crude oil trade because of how it affects their economies.

This study therefore considered macroeconomic reasons when considering the factors that would have an effect on bargaining power in the crude oil trade, both for China and its major crude oil partners. These factors can be broadly categorized into energy-related factors and non-energy-related factors. This is because China mainly uses crude oil as an energy source, and the factors have to do with energy-related issues such as China's energy consumption, oil consumption, and alternative energy use. For the non-energy-related factors, they relate to how crude oil is used by China but are not energy-based, such as population growth and China's FDI in its major crude oil exporting countries.

These factors have proven to have an effect on bargaining power, as shown by the panel regression analysis. The data for the factors was gathered from multiple sources, including Clarkson's Shipping Intelligence Network, British Petroleum Statistics, and UNCOMTRADE.

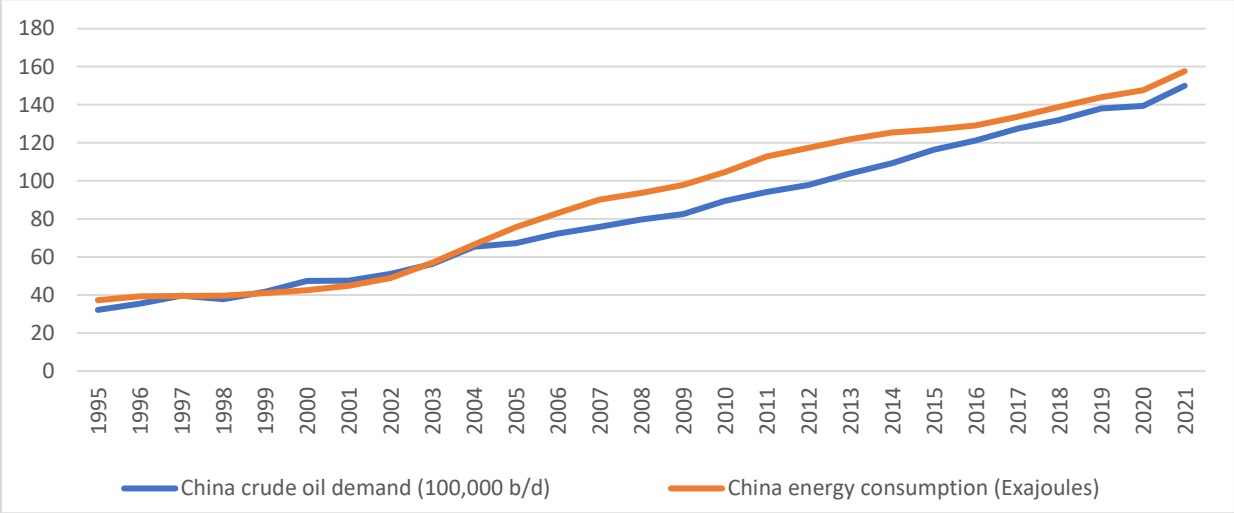
5.2 Bargaining power of China's major crude oil partners

The study analyzed China's bargaining power by first determining the relationship in terms of dependency between China and its major crude oil partners. This relationship is defined on the one hand as the dependency of China on its major partners for crude oil supply and, on the other hand, as the dependency of the partners on China to buy crude oil from them, given that China is one of their largest buyers. For the panel regression analysis, this meant there were two dependent variables.

There are five variables that affect the bargaining power of China's crude oil partners. The model showed that two have a positive relationship, while the other three have an inverse relationship with the bargaining power of China's major crude oil partners.

5.2.1 Relationship of energy consumption by China and crude oil import

China's energy consumption has a positive relationship with the bargaining power of its major crude oil partners, which means that it will increase when China consumes more energy. China mainly utilizes crude oil for energy and manufacturing purposes, which consume a high quantity of crude oil. Whenever China's demand for energy consumption increases, it will need to import more, especially from its biggest suppliers, thereby depending more on them to supply, which then gives these countries a higher bargaining power.



Source: Data collected from BP Statistics and OPEC (graph created by authors)

Figure 4: China's crude oil demand and energy consumption

As depicted in figure 2, there is a high correlation between China's demand for energy and its crude oil production, which illustrates how important crude oil is to China's energy consumption and how it relies heavily on crude oil as an energy source. This supports the analysis above, where the high dependency on crude oil by China for energy improves the bargaining power of its major crude oil partners.

5.2.2 Bilateral dependency between China and its major crude oil trading partners

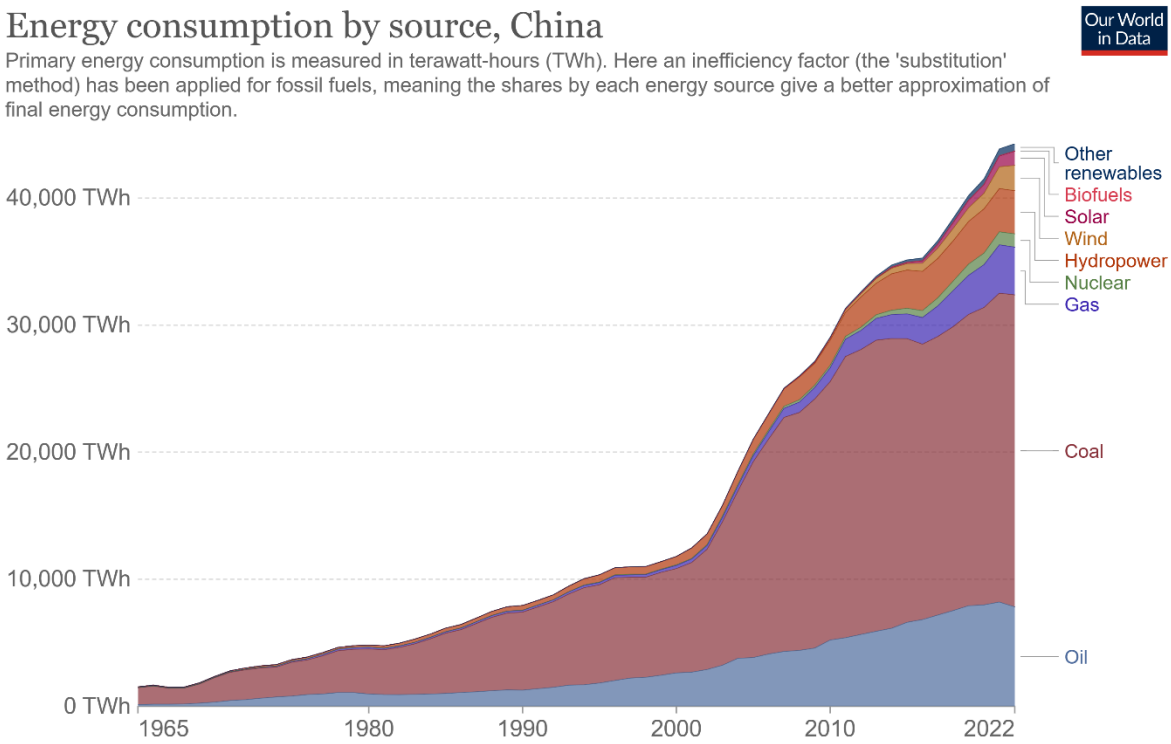
The trade dynamics that China has with the rest of the world are based on a system whereby it largely imports raw materials from other countries and exports finished goods. This is the same dynamic it has with its major crude oil partners, with crude oil being the raw material it imports in this scenario. Therefore, it was imperative to analyze whether the imports of finished goods from China would have an effect on either party's bargaining power. The variable, the import of Chinese products by its major crude oil partners, has a positive relationship with the bargaining power of these countries, whereby it increases when they import more from China. There is a dependency between these countries

regarding crude oil, but China also depends on them on another aspect of its trade, which is the export of its finished goods. This dependence is not peculiar to only these countries but also to most countries because China relies on countries to buy its finished goods, and at the same time, other countries depend on China for finished products.

Consequently, this variable being positive for the major crude oil partners shows that when they import goods, they will have a higher bargaining power in their crude oil trade. This is because the import adds more revenue to China and helps in developing its economy, and the upper hand they wield can be used to ask China to buy more crude oil from them. This all lies in bilateral dependency between countries and their attempts at maximizing their comparative advantage when trading. This is the process by which a country builds bilateral trade agreements with other countries.

5.2.3 Alternative energy consumption in China and its impact on crude oil trade

The variable alternative energy consumption of China has a negative relationship with the bargaining power of China's major crude oil partners, which means that it reduces the more China increases its alternative energy use. Alternative energies are energy sources that try to cut down on carbon emissions from fossil fuels. Crude oil will account for 32% of carbon emissions in 2022 (IEA, 2023) which denotes that the more use of alternative energy sources, the less crude oil will be used by China. This will decrease the demand for crude oil and, thus, the bargaining power of China's crude oil partners. Crude oil is one of their major sources of revenue, and they are losing part of this revenue when one of its major buyers, China, reduces its demand.



Source: Energy Insititute Statistical Review of World Energy (2023)

Figure 5: China energy consumption by source

It is important to note, as shown in figure 3, that an increase in alternative energy by China may not translate directly into a reduction in demand for crude oil because China has a large demand for energy, and the diversification of energy sources could mean it is trying to satisfy its overall energy demand. Nevertheless, with the country also on the decarbonization campaign, especially in recent years, going into the future, an increase in alternative energy could lead to a decrease in the demand for crude oil.

5.2.4 Bargaining power and increase in crude oil production

Crude oil production by China's major crude oil partners also has a negative relationship with their bargaining power, which is reduced when the countries produce more crude oil. It is well established that crude oil does not need storage as it is in the ground and can be

drilled at the right time and in the right conditions. Therefore, when there is an increase in crude oil production, the countries are not bothered about getting rid of inventory but will attempt to maximize revenue. The more they sell while production is high, the more revenue they generate. This has been one of the major characteristics of oil booms, where countries look to sell as much as possible in order to attain more profit.

This is the same scenario when China's major crude oil exporting countries have a ramp-up in crude oil production. They will look towards their buyers to buy more, and with China being one of their largest buyers as well as a very rich country, they could be desperate for China to buy. This desperation will mean that they lose their bargaining power while attempting to get China to increase its demand.

5.2.5 Effects of crude oil refining by China's major crude oil trading partners

The final significant variable for China's major crude oil partners is crude oil refining in these countries, which also has an inverse relationship with their bargaining power. This means that the more they refine, they will have a decrease in their bargaining power. All things being equal, when they refine more crude oil, the quantity they sell will reduce, which will lead to their buyers trying to cajole them to sell more so the buyers meet their demand, and this should increase the exporting country's bargaining power. Theoretically, however, when a buyer cannot fulfill his demand from a seller, they look for alternatives and buy from other sellers, which could affect how they trade with the seller in the future. This assumption is what the model is alluding to and what will be explained.

If it is assumed that the negotiations for crude oil are in cycles whereby two countries agree on the trade for a period of time and an agreed quantity (Salih & Salih, 2015), the same agreement will attempt to be reached in the next cycle. In this next cycle, if the selling country informs the buyer that it cannot sell up to the amount it did because it needs to refine for local use or export, then the buyer will have to look for alternatives to fulfill its demand. Going forward, it will be assumed that the seller's volume of sales has

decreased. In this case, the seller loses its bargaining power because the buyer has identified alternative sellers. This could be a reason why China's major crude oil partners will have reduced bargaining power when they increase crude oil refining.

5.3 China's bargaining power in crude oil trade

There are three variables which are significant for China's bargaining power with one having a positive relationship while the other two are negative.

5.3.1 China's benefit in increase of crude oil production rate

The crude oil production rate has a positive relationship with China's bargaining power, which entails that an increase in the production rate leads to an increase in China's bargaining power. This is simply because when crude oil production increases, they will want to sell more, which will lead to a higher dependence on China to buy, thereby increasing China's bargaining power. China can capitalize on this bargaining power by attaining improved trade deals not just in crude oil but in other products, as well as by imploring these countries to buy more of its products.

5.3.2 Foreign Direct Investment by China in major crude oil exporting countries

The second significant variable is the foreign direct investment (FDI) by China in the major crude oil countries, which has a negative relationship, meaning that the more FDI increased in these countries by China, the less bargaining power it will have. This is explained by bilateral dependency, in which countries only invest in countries where they have vested interests. Any country that sees another country increasing its investments in its territory knows that it seeks to improve its bilateral relations, including trade, which the country can use to its advantage in order to get better deals in negotiations. This is why, when FDI by China increases, it will lose its bargaining power in the crude oil trade.

5.3.3 Crude oil refining in major exporting countries and its impact on China

The final variable that is significant for China's bargaining power is the crude oil refining by its major crude oil partners, whereby China's bargaining power reduces when the countries increase their crude oil refining capacity or quantity. This will mean, as highlighted above, that China will want to fulfill its demand and will try to buy as much as possible from its largest partners despite their reduced quantity to sell. China's major crude oil partners are also some of the largest crude oil-producing countries; therefore, it is easy to negotiate terms to increase the amount it will buy due to the large quantity of reserves they have. However, this will mean it is desperate and will lead to a reduction in its bargaining power.

5.4 Bargaining power and balance of trade

In order to determine which party had the higher bargaining power, the study relied on the results of the regression. From the results of the analysis, using the same independent variables for the bargaining power of either party, there are five factors (variables) that are significant for China's major crude oil partners compared to three for China. Additionally, out of the five for the former, two are positive, which means they increase the bargaining power of China's major crude oil partners, while only one is positive for China's bargaining power. Therefore, it can be concluded based on the model that China's major crude oil partners have a higher bargaining power than China in the crude oil trade.

The study also had the aim of comparing the relationship between bargaining power in crude oil and the balance of trade, which stems from the dynamics of bilateral dependency. Since there is bilateral dependency on oil between the two parties, it is logical to also explore the possibility of overall trade dependency, which is determined by China's balance of trade with each of its top five crude oil partners. This relationship is meant to provide insight into whether dependency on one product can be similar to dependency on the trade of all goods.

To achieve this, the study made use of the fixed effect in the regression analysis to compare it with the balance of trade. The results of this comparison showed that there is no relationship between the bargaining power of either China or its major partners in crude oil trade and the balance of trade between China and the countries.

5.5 Policy implications

The trade of crude oil, especially for China, is linked to bilateral dependency as well as the significant (variable) factors that were found in this study to be significant to the bargaining power of China and its major crude oil partners. Therefore, policymakers in China and its major crude oil trading partners could develop some policies in order to improve their bargaining position.

For China

In order to guarantee China's continuous supply of crude oil, some changes might be seen in China's long-term regulation policy on crude oil importation and trade, which is the combination of non-state-listed companies and state-listed companies on the trade of crude oil. China allows companies listed as state-owned to import crude oil freely, while companies listed as non-state trading companies would have to obtain quotas based on their crude oil import qualification. This allows the private companies to obtain a quota of crude oil, which continues to grow just as crude oil demand continues to grow. Also, the Chinese Ministry of Commerce later allowed crude oil processing enterprises to obtain quotas based on the volume of oil they could produce on an annual basis. All these applications were also accepted based on some factors, which include the quota amount, which depended on the past quota that was used by the refiner, the refiner's tax compliance status, the total application volume, and many more. All these processes have limited the number of non-state-owned enterprises that can obtain a quota to import crude oil.

The trend for China's energy consumption shows that it is growing and is also highly linked to China's crude oil demand and imports (Figure 2). Based on the findings of this study, which found that China has lower bargaining power in crude oil trade with its trading partners, it would require the participation of private enterprises for the importation of the country's growing crude oil demand. This is because state-listed companies like PetroChina and CNOOC might not be able to import the required volume based on financial or capacity purposes. Private enterprises would be required to fill in the volume of imports that could not be imported by state-listed companies.

The crude oil import regulation policy should also be either modified or completely changed for the purpose of fulfilling China's growing demand for crude oil, despite its rapid switch to alternative energy. Due to China's land mass, population size, and energy demands for factories, it will be the world's biggest carbon emitter in 2021, according to the Emissions Database for Global Atmospheric Research (EDGAR, 2022). As the largest crude oil importer in the world, China has also invested heavily in alternative energy in recent years due to the need to reduce carbon emissions from fossil fuels. All these factors will have an implication on China's policy on the importation of crude oil, as it will want to maintain its bargaining power when it comes to alternative energy. China could choose one of these:

i. Delegate the importation of crude oil to private enterprises after a review of the crude oil importation quota policy, while state-listed enterprises increase their investments in alternative energy sources in order to drastically reduce their carbon emissions. As already reported, the ministry of commerce has already started releasing larger allowances than the established annual quota ceiling and also releasing quotas for the subsequent years (this was done in 2022 due to the slow flow of crude oil imports), with the main aim of encouraging larger imports and more refinery activities (S&P Global Commodity Insights, 2023).

ii. Allow private enterprises to participate in the investment involved in the switch to alternative energy. This is because state-owned enterprises are rarely flexible with change. Private enterprises, on the other hand, easily adjust to change based on urgency and the demand and supply nature of the commodity in question.

For China's major crude oil trading partners

In light of the findings of the study and as crude oil exporting countries continuously seek ways and means of drawing trade agreements that are favorable to them, crude oil exporting countries might choose to consider various policy adjustments to exercise their full power of bargaining. Countries that have placed various export restrictions and some export-limiting statues in the bid to protect and control their market prices and terms and conditions, like the United States, Russia, and Saudi Arabia, will lift such restrictions upon knowledge of where their bargaining power lies (based on the findings of the study). This will be a means of widening their access to global markets, since the chance of increasing their crude oil production may increase the size of their economies (having bargaining power in the bargaining process). However, allowing full entry into the global crude oil market will also mean that international prices set for crude oil will congregate to a certain degree. While the situation described will be beneficial for any country's crude oil producers and export countries, it could also possibly have an opposite effect on crude oil refining establishments in the countries as well. This will be in cases where there is a discount in crude oil prices set at an international level. The crude oil refiners will also be obliged, even though their production costs should be higher. Some of China's major crude oil partners (Angola, Iraq, and Oman) are more involved in crude oil export than in refining. The fact that China imports crude oil, refines it, and sells it to other countries illustrates that it is a lucrative source of revenue. Considering the fact that the countries have been found to possess a higher bargaining power in this relationship, oil-producing countries would also increase their revenue by diversifying into the refining of crude oil,

which should be cheaper compared to China because crude oil as the raw material is readily available.

As regards the importation of Chinese products, the major crude oil exporting countries mentioned in the study have a higher chance of setting policies through their bargaining power. The countries could implement policies that would afford them the opportunity to demand flexible import terms and opportunities from China. This will give their citizens the opportunity to buy cheaper goods with a diverse supply and will also boost business opportunities, thereby improving their GDP. It is expected that crude oil-producing establishments in China's major crude oil exporting countries will put some pressure on their governments to negotiate more favorable trade agreements, which will lead to easier market access.

5.6 Limitations of the Study

The study required data for calculating the bargaining power of both parties and also for the independent variables and was able to get most of the data. Unfortunately, there was a gap in the data for Foreign Direct Investment (FDI) by China in the selected countries. The data was incomplete because it started from 2003 for some countries and 2007 for others. It was also fragmented because it had to be collected from different sources.

References

Addison, J. T. (2016). Collective bargaining systems and macroeconomic and microeconomic flexibility: the quest for appropriate institutional forms in advanced economies. *IZA Journal of Labor Policy*, *5*(1). https://doi.org/10.1186/s40173-016-0075-8

Ahrens, A., Aitken, C., Ditzen, J., Ersoy, E., Kohns, D., & Schaffer, M. E. (2020). *A Theory-Based Lasso for Time-Series Data*. 3–36. https://doi.org/10.1007/978-3-030-48853-6_1

Akhaukwa, P. J., Maru, L., & Byaruhanga, J. (2013). Relationship of Parties to Collective Bargaining and Industrial Relations Environment in Public Universities in Kenya. *Mediterranean Journal of Social Sciences*, *4*(2039-2117). https://doi.org/10.5901/mjss.2013.v4n11p705

Ali, P., & Younas, A. (2021). Understanding and interpreting regression analysis. *Evidence Based Nursing*, *24*(4), 116–118. https://doi.org/10.1136/ebnurs-2021-103425

Azad, S. (2023). Bargain and Barter: China's Oil Trade with Iran. *Middle East Policy*. https://doi.org/10.1111/mepo.12669

Baek, J., & Yoon, J. H. (2023). Shocks of crude oil prices and world trade policy uncertainty: How much do they matter for China's trade balance with its three largest partners? *Economic Analysis and Policy*. https://doi.org/10.1016/j.eap.2023.04.037

Binmore, K., Rubinstein, A., & Wolinsky, A. (1986). The Nash Bargaining Solution in Economic Modelling. *The RAND Journal of Economics*, *17*(2), 176. https://doi.org/10.2307/2555382

Blavasciunaite, D., Garsviene, L., & Matuzeviciute, K. (2020). Trade Balance Effects on Economic Growth: Evidence from European Union Countries. *Economies*, *8*(3), 54. https://doi.org/10.3390/economies8030054

Bounie, D., Dubus, A., & Waelbroeck, P. (2020). Market for Information and Selling Mechanisms. *SSRN Electronic Journal*, *2364-1428*. https://doi.org/10.2139/ssrn.3618830

BP. (2022). *bp Statistical Review of World Energy 2022*. https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2022-full-report.pdf

Buckley, P. (2009). *Foreign Direct Investment, China and the World Economy*. Springer.

Burton, A. L. (2021). OLS (Linear) Regression. *The Encyclopedia of Research Methods in Criminology and Criminal Justice*, 509–514. https://doi.org/10.1002/9781119111931.ch104

Butovitsch, P. V. (2016). *Is the Buyer's Bargaining Power in Business-to-Business Negotiations too strong?* [Online Publication]. https://www.researchgate.net/publication/339147081_Is_the_Buyer's_Bargaining_Power_in_a_Business-to-Business_Relation_too_Strong

CEIC. (2022). *China Crude Oil: Imports, 2010 – 2021 Data*. Www.ceicdata.com. https://www.ceicdata.com/en/indicator/china/crude-oil-imports

Chen, H., & Sun, Z. (2021). International crude oil price, regulation and asymmetric response of China's gasoline price. *Energy Economics*, *94*, 105049. https://doi.org/10.1016/j.eneco.2020.105049

CNPC. (2022). *Report on Domestic and Overseas Oil & Gas Industry Development in 2022. Petroleum Industry Press, Beijing.* CNPC.

Crook, T. R., & Combs, J. G. (2007). Sources and consequences of bargaining power in supply chains. *Journal of Operations Management*, *25*(2), 546–555. https://doi.org/10.1016/j.jom.2006.05.008

De Dreu, C. K. W., & Van Kleef, G. A. (2004). The influence of power on the information search, impression formation, and demands in negotiation. *Journal of Experimental Social Psychology*, *40*(3), 303–319. https://doi.org/10.1016/j.jesp.2003.07.004

EDGAR. (2022). *EDGAR - The Emissions Database for Global Atmospheric Research*. Edgar.jrc.ec.europa.eu. https://edgar.jrc.ec.europa.eu/report_2022#:~:text=In%202021%2C%20China%2C%20the%20United%20States%2C%20the%20EU27%2C

Fang, T. (2006). Negotiation: the Chinese style. *Journal of Business & Industrial Marketing*, *21*(1), 50–60. https://doi.org/10.1108/08858620610643175

Gago-Rodríguez, S., Márquez-Illescas, G., & Núñez-Nickel, M. (2021). Bargaining power as moderator of the "delay costs effect" in supply chain negotiations. *Management Accounting Research*, *51*(100737), 100737. https://doi.org/10.1016/j.mar.2021.100737

Gamache, L., Hammer, A. B., & Jones, L. (2013, April 1). *China's Trade and Investment Relationship with Africa*. Social Science Research Network. https://ssrn.com/abstract=3370575

George, L., & Zhdannikov, D. (2016, May 24). Debt repayments in crude cripple poorer oil producers. *Reuters*. https://www.reuters.com/article/us-opec-revenues-debt-idUSKCN0YF0IC

Hakan Berument, M., Basak Ceylan, N., & Dogan, N. (2010). The Impact of Oil Price Shocks on the Economic Growth of Selected MENA1 Countries. *The Energy Journal*, *31*(1). https://doi.org/10.5547/issn0195-6574-ej-vol31-no1-7

Hao, X. (2023). Import competition and pressure in the international crude oil trade: A network analysis. *Resources Policy*, *82*, 103468. https://doi.org/10.1016/j.resourpol.2023.103468

Herberg, M. E., Andrews-Speed, P. A.-S., & Shobert, B. (2014). China's Energy Crossroads: Forging a New Energy and Environmental Balance. *The National Bureau of Asian Research (NBR)*, *47*. https://www.nbr.org/publication/chinas-energy-crossroads-forging-a-new-energy-and-environmental-balance/

IEA. (2023, June). *Growth in global oil demand is set to slow significantly by 2028 - News - IEA*. IEA. https://www.iea.org/news/growth-in-global-oil-demand-is-set-to-slow-significantly-by-2028

Ilechukwu, N., & Lahiri, S. (2022). Renewable-energy consumption and international trade. *Science Direct*, *8*(2352-4847), 10624–10629. Energy Reports. https://doi.org/10.1016/j.egyr.2022.08.209

Imai, K. (2021). *Difference-in-Differences and Fixed Effects Motivation*. https://imai.fas.harvard.edu/teaching/files/DiD_fixed_effects.pdf

IMF. (2011). Changing Patterns of Global Trade . In *International Monetary Fund*. imf.org. www.imf.org/external/np/pp/eng/2011/061511.pdf

ISLAM, M. M., BALASANYAN, A., & MOHAMED, M. M. (2022a). *Shipping Asset Pricing: A Rubinstein Bargaining Approach* [MSc Thesis]. https://commons.wmu.se/cgi/viewcontent.cgi?article=3082&context=all_dissertations

ISLAM, M. M., BALASANYAN, A., & MOHAMED, M. M. (2022b). *Shipping Asset Pricing: A Rubinstein Bargaining Approach.* [Pdf]. https://commons.wmu.se/cgi/viewcontent.cgi?article=3082&context=all_dissertations

Jiménez-Rodríguez, R. (2022). Oil shocks and global economy. *Energy Economics*, *115*, 106373. https://doi.org/10.1016/j.eneco.2022.106373

Kaliyadan, F., & Kulkarni, V. (2019). Types of variables, descriptive statistics, and sample size. *Indian Dermatology Online Journal*, *10*(1), 82–86. ncbi. https://doi.org/10.4103/idoj.IDOJ_468_18

Khan, M. F. (2022). *Movement of Bargaining Power: International Oil Companies and Developing Countries* (p. 15) [Research Paper]. https://sites.dundee.ac.uk/energyhubplus/wp-content/uploads/sites/195/2022/07/CAR-2022-Muhammad-Fahim-Khan-Research-Paper.pdf

Kilian, L., Rebucci, A., & Spatafora, N. (2009). Oil shocks and external balances. *Journal of International Economics*, *77*(2), 181–194. https://doi.org/10.1016/j.jinteco.2009.01.001

Kissell, R., & Poserina, J. (2017). *Optimal sports math, statistics, and fantasy* (pp. 103–135). Academic Press, An Imprint Of Elsevier.

Landstrom, J. (2019). Regression Analysis and Panel Data. *SSRN Electronic Journal*, *02*. https://doi.org/10.2139/ssrn.3487658

Lang, K., & Auer, B. R. (2020). The economic and financial properties of crude oil: A review. *The North American Journal of Economics and Finance*, *52*, 100914. https://doi.org/10.1016/j.najef.2019.01.011

Lee, A., & Kim, J. (2023). Analysis of Bargaining Power between the EU and Russia by Altering Gas Supply Network Structure. *Sustainability*, *15*(5), 4655. https://doi.org/10.3390/su15054655

Li, S., Khan, S. U., Yao, Y., Chen, G. S., Zhang, L., Salim, R., & Huo, J. (2022). Estimating the long-run crude oil demand function of China: Some new evidence and policy options. *Energy Policy*, *170*(0301-4215), 113244. https://doi.org/10.1016/j.enpol.2022.113244

Liu, H.-W. ., & Maughan, J. (2012). China's Rare Earths Export Quotas: Out of the China-Raw Materials Gate, But Past the WTO's Finish Line? *Journal of International Economic Law*, *15*(4), 971–1005. https://doi.org/10.1093/jiel/jgs037

Mantas, V., Pehlivanidis, A., Kotoula, V., Papanikolaou, K., Vassiliou, G., Papaiakovou, A., & Papageorgiou, C. (2022). Factors of influence in prisoner's dilemma task: a review of medical literature. *PeerJ*, *10*, e12829. https://doi.org/10.7717/peerj.12829

Mattgard, D., & Astrom, J. (2005). *Business negotiations with the Chinese: The Swedish perspective* [Masters Thesis]. https://www.diva-portal.org/smash/get/diva2:1022739/FULLTEXT01.pdf

Mućk, J. (2018). *Econometrics of Panel Data*. https://web.sgh.waw.pl/~jmuck/EoPD/Meeting3.pdf

O'brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & Quantity*, *41*(5), 673–690. https://doi.org/10.1007/s11135-006-9018-6

Odhiambo, N. M., Sheilla Nyasha, Zerihun, M. F., & Tipoy, C. K. (2019). *Financial Development in Africa*. 37–60. https://doi.org/10.1016/b978-0-12-814164-9.00003-7

OEC. (2022). *Refined Petroleum in China | OEC*. OEC - the Observatory of Economic Complexity. https://oec.world/en/profile/bilateral-product/refined-petroleum/reporter/chn#:~:text=The%20main%20destination%20of%20Refined%20Petroleum%20exports%20from

OPEC. (2022). OPEC: Organization Petroleum Exporting Countries: 2022 Annual Report. In *OPEC* (Vol. 6, Issue 1, p. 116). https://www.opec.org/opec_web/static_files_project/media/downloads/publications/AR%202018.pdf

Pedersen, R. H. (2014). *The politics of oil, gas contract negotiations in Sub-Saharan Africa*. JSTOR. https://www.jstor.org/stable/resrep15998

Pescatori, A., & Nazer, Y. (2022). OPEC and the Oil Market. *IMF Working Papers*, *2022*(183), 1. https://doi.org/10.5089/9798400219788.001

Phillips, G. D. A., & Harvey, A. C. (1974). A Simple Test for Serial Correlation in Regression Analysis. *Journal of the American Statistical Association*, *69*(348), 935–939. https://doi.org/10.1080/01621459.1974.10480231

Raimundo, J. Z., Echeimberg, J. D. O., & Leone, C. (2018). Research methodology topics: Cross-sectional studies. *Journal of Human Growth and Development*, *28*(3), 356–360. Researchgate. https://doi.org/10.7322/jhgd.152198

Rosenblad, A. (2020). The mean, variance, and bias of the OLS based estimator of the extremum of a quadratic regression model for small samples. *Taylor & Francis Group*, *51*(9), 2870–2886. https://doi.org/10.1080/03610926.2020.1782936

Salih, M., & Salih, R. (2015). *Strategy of Oil Contract Negotiation*. *6*, 165.

Samargandi, N., Fidrmuc, J., & Ghosh, S. (2014). Financial development and economic growth in an oil-rich economy: The case of Saudi Arabia. *Economic Modelling*, *43*, 267–278. https://doi.org/10.1016/j.econmod.2014.07.042

Schneyer, J., & Perez, N. M. M. (2013, November 26). Special Report: How China took control of an OPEC country's oil. *Reuters*. https://www.reuters.com/article/us-china-ecuador-oil-special-report-idUKBRE9AP0HX20131126

Steinel, W., & Harinck, F. (2020). Negotiation and Bargaining. *Oxford Research Encyclopedia of Psychology*. https://doi.org/10.1093/acrefore/9780190236557.013.253

Stiller, Y. (2023). Bargaining Power in a Globalized World: The Effect of Global Value Chains in Trade Negotiations. *Business and Politics*, *25*(2), 1–22. https://doi.org/10.1017/bap.2023.5

UNCTAD. (2022). *World Investment Report | UNCTAD*. Unctad.org. https://unctad.org/topic/investment/world-investment-report

Uyanık, G. K., & Güler, N. (2013). A Study on Multiple Linear Regression Analysis. *Procedia - Social and Behavioral Sciences*, *106*(1), 234–240. https://doi.org/10.1016/j.sbspro.2013.12.027

Vivoda, V. (2008). *The Return of the Obsolescing Bargain and the Decline of Big Oil: A Study of Bargaining in the Contemporary Oil Industry*. VDM Verlag Dr. Müller. https://www.researchgate.net/publication/48381552_The_Return_of_the_Obsolescing_Bargain_and_the_Decline_of_Big_Oil_A_Study_of_Bargaining_in_the_Contemporary_Oil_Industry

Vivoda, V. (2011). Bargaining Model for the International Oil Industry. *Business and Politics*, *13*(4), 1–34. researchgate. https://doi.org/10.2202/1469-3569.1384

Wang, K.-H., Su, C.-W., Umar, M., & Lobonţ, O.-R. (2022). OIL PRICE SHOCKS, ECONOMIC POLICY UNCERTAINTY, AND GREEN FINANCE: A CASE OF CHINA. *Technological and Economic Development of Economy*, *0*(0), 1–18. https://doi.org/10.3846/tede.2022.17999

Xue, Q., Cheng, C., Wang, Z., & Liu, M.-M. (2021). Bargaining strategy of oil companies in international oil and gas development Projects–Based on a bilateral bargaining model. *Petroleum Science*, *18*(4). https://doi.org/10.1016/j.petsci.2021.05.002

Yang, C.-L., Mitropoulos, A., & Weimann, J. (2000). An Experiment on Bargaining Power in Simple Sequential Games. *ResearchGate*.

Yuen, T. H. A., & Yuen, W. K. T. (2022). Relationship Between Geopolitical Risk In Major Oil Producing Countries and Oil Price. *International Journal of Energy Economics and Policy*, *12*(5), 117–123. https://doi.org/10.32479/ijeep.13373

Appendices

Appendix 1: Regression results

Bargaining power of China's major crude oil partners

```
Linear regression model:
    Y1 ~ 1 + X2 + X3 + X6 + X7 + X8 + X9 + X10 + X11 + X12

Estimated Coefficients:
                   Estimate          SE          tStat       pValue
                   ________    __________    ________    _________

    (Intercept)     0.29316       0.18829       1.557       0.122
    X2            0.0035768     0.0012414      2.8812    0.0046638
    X3             -0.023667     0.0097941     -2.4165     0.017117
    X6            -0.0054415     0.0037924     -1.4349      0.15383
    X7               0.08214      0.040975      2.0046     0.047161
    X8              -0.20221      0.082038     -2.4649     0.015064
    X9             0.0018606     0.0019927      0.9337      0.35226
    X10          -9.6848e-06     2.126e-05    -0.45553      0.64952
    X11             -0.11339      0.039005     -2.9071    0.0043171
    X12          -0.00099294    0.00071653     -1.3858      0.16828


Number of observations: 135, Error degrees of freedom: 125
Root Mean Squared Error: 0.13
R-squared: 0.621,  Adjusted R-Squared: 0.594
F-statistic vs. constant model: 22.8, p-value = 1.67e-22
```

China's bargaining power in crude oil trade

```
Linear regression model:
    Y2 ~ 1 + X3 + X6 + X7 + X8 + X9 + X10 + X11 + X12 + X13

Estimated Coefficients:
```

	Estimate	SE	tStat	pValue
(Intercept)	-1.5566	0.89671	-1.7359	0.08504
X3	0.0016726	0.0022602	0.74001	0.46068
X6	0.00013722	0.0013962	0.098278	0.92187
X7	-0.014605	0.013785	-1.0595	0.29143
X8	0.13143	0.02904	4.5259	1.3816e-05
X9	0.0013667	0.00074938	1.8238	0.070575
X10	1.581e-05	7.5973e-06	2.0811	0.039471
X11	-0.086006	0.014696	-5.8522	3.9985e-08
X12	0.00027714	0.00021897	1.2657	0.20799
X13	0.33143	0.20277	1.6345	0.10467

```
Number of observations: 135, Error degrees of freedom: 125
Root Mean Squared Error: 0.0491
R-squared: 0.344,  Adjusted R-Squared: 0.297
F-statistic vs. constant model: 7.29, p-value = 1.75e-08
>>
```

Fixed effect – Bargaining power of China's major crude oil partners

```
Linear regression model:
    Y1 ~ 1 + Country + X2 + X3 + X6 + X7 + X8 + X9 + X10 + X11 + X12 + X13

Estimated Coefficients:
```

	Estimate	SE	tStat	pValue
(Intercept)	-5.295	2.4405	-2.1696	0.032006
Country_Iraq	-0.38529	0.17118	-2.2508	0.026219
Country_Oman	0.044313	0.065472	0.67682	0.49982
Country_Russia	-0.5019	0.48093	-1.0436	0.29876
Country_Saudi Arabia	-0.53654	0.30517	-1.7581	0.081275

Fixed effect – China's bargaining power in crude oil trade

```
Linear regression model:
    Y2 ~ 1 + Country + X2 + X3 + X6 + X7 + X8 + X9 + X10 + X11 + X12 + X13
```

Estimated Coefficients:

	Estimate	SE	tStat	pValue
(Intercept)	-1.3011	0.7232	-1.7991	0.074509
Country_Iraq	-0.047454	0.050726	-0.93549	0.35141
Country_Oman	0.081474	0.019402	4.1993	5.1679e-05
Country_Russia	-0.43503	0.14252	-3.0525	0.0027951
Country_Saudi Arabia	-0.10896	0.090433	-1.2049	0.23063