Advances in Economics, Business and Management Research, volume 203
Proceedings of the 2021 3rd International Conference on Economic Management and Cultural Industry (ICEMCI 2021)

The Sudden Effects of Crude Oil Futures

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ABSTRACT
The sudden effect of crude futures oil refers to specific events that lead to significant fluctuation in the price of the futures. Event analysis on major occurrences paves us a path to avoid these failures. This article aims to investigate the causality of event-related price vacillations on crude oil. Specifically, this study inspects recent major crude oil price drop incidents, including the Yuan You Bao Failure, the Russia-Saudi Arabia oil price war, and the Suez Canal obstruction. The causes range from human errors on policy differences to naturally occurred disasters and national conflicts. In detail, the Yuan You Bao failure results from a mistake on the Bank of China's financial product dropping below 0 in the Chicago Mercantile Exchange. Besides, the sudden disagreement on supply and demand gives rise to the revenging increase in crude oil production between Russia and Saudi Arabia. Additionally, the Suez Canal Obstruction is ascribed to Ever Given's container ship running aground and blocking the canal after an unpredicted sandstorm. Apart from the events' unpredictability, it finds general flaws in human regulations and market supervision. The comprehensive analysis indicates the importance of law implementations relating to policy regulations on crude oil prices. These results shed light for investors to understand specific events' effects on making decisions and offer solutions for the government in emergency circumstances.

Keywords: *crude oil futures, sudden effects, Yuan You Bao failure, Russia-Saudi Arabia oil price war, Suez Canal obstruction.*

1. INTRODUCTION

As one of the major energy resources supporting world industrialization, crude oil connects the economics of all continents. As more and more populations start to realize their financial potential, the vein of crude oil extends further to more investors. Among the choices, crude oil futures are becoming a more accessible financial product even for individual investors. Since investors in the field always try to avoid risks, lots of scholars have dig into common factors affecting the price changes. However, one can never predict its volatility precisely as extreme situations, or unprecedented events will not be contained in common factors. Plenty of these events might occur suddenly and result in tremendous losses when the public is overwhelmed by panic.

To find solutions for similar emergencies, scholars have been studying past events case by case. In the market of crude oil, events causing great price fluctuations catch the most attention. From the scope of politics, banking to natural incidents, professionals have conducted discussions about three representative and influential events in recent decades around the world: the Saudi-Russia price war, the failure of Yuan You Bao (China), and the Suez Canal obstruction. Starting with the price war following the pandemic in 2020, the crude oil futures market had experienced a shock in price. The general low price of crude oil caused the first negative futures price in history, which becomes the main factor of the Yuan You Bao crisis. The obstruction, in another dimension, also made inevitable losses. Previous studies have clarified their interpretations about the causations behind and find that it is too naïve to attribute the

outcomes to one or two factors even for such gigantic-scaled events.

Fortunately, scholars have come out with multiple possible solutions targeting the same kinds of crises. Although such events may be inevitable to most due to their limited reaction period, investors can still get put their loss under control by preparing early based on solutions for the past problems. The bright future of the crude oil market lies in cooperation between nations. For financial product failure, stricter regulation on the market and more mature contracts would be helpful. With the fear of black swan events, it is better for businessmen as well as investors to keep alternatives in their hands. In this review, in order to be specific, this paper makes three separate sections, each discussing the findings and solutions for a particular event. The combination of the events in different dimensions would create a better picture of the sudden effect of crude oil futures prices for investors and scholars.

2. RUSSIA-SAUDI ARABIA OIL PRICE WAR

In recent years, Russia-Saudi Arabia is one of the most deeply and widely affected sudden issues for the crude oil price since it directly aggravated the unbalance of demand and supply sides and further influences global financial market volatilization with great losses. Because oil is still the most widely and fundamentally used fuel throughout global industries, the oil price is one of the most important indicators for worldwide economics. That explains why this oil price war could be the potential trigger of the following Crude oil companies' bankrupt issues in the USA, Yuan You Bao issue in China, and the MCX issue in India.

Crude oil prices are determined by the global balancing condition of supply and demand, which indicates that any potential fluctuations in either demand and supply side could be a trigger for financial volatility that leads to great losses. Owing to the huge validation on the demand side linking with various industries and individuals, the supply side is more able to react and control as few countries are the main exporter of oil. Therefore, the OPEC+ agreement was established in 2016. It consisted of main exporting countries that obtain over 50% oil production to react to the supply change by their contract and keep worldwide oil price stabilization [1].

At the beginning of 2020, the sudden outbreak of COVID-19 had frozen economic activities and led to a dramatic drop in oil demand for approximately three million barrels a day in one of the largest oil consumptions countries, China. International energy agency had claimed the lowest oil demand accreting rate since 2011 [2]. To balance the market and stabilize prices, OPEC has considered a whole year reduction of around 1.5 million barrels per day and proposed this new consensus on oil production cuts to OPEC+ countries on March 6, 2020 [3]. However, the failure of proposal negotiation with OPEC+ member country Russia infuriated Saudi Arabia to take extreme measures, which simulated production to even breaking the highest historical record. This unexpected issue leads to the dramatic drop of 34% in WTI oil futures and 26% in crude oil prices [4].

Moreover, the spreading range and speed of COVID-19 in the following months were much faster than the previous estimation, which caused huge miss-determining in the oil price strategy between counties. The worldwide pandemic had caused a further shrinking in oil consumption. Superposed by Saudi Arabia's revenging increase of oil production, the gap between demand and supply has been widened significantly, which triggered the further collapse and even led to the first negative oil price at -$37.63 of West Texas Intermediate (WTI) in history on April 20 [5].

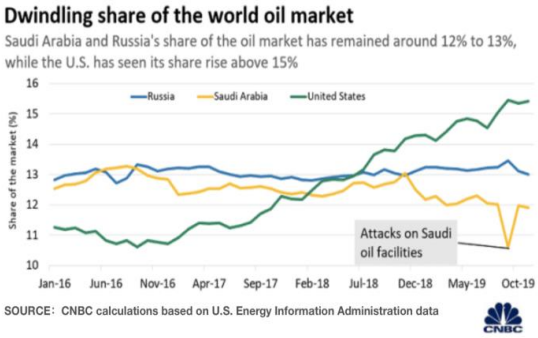

Figure 1. International shares of the world oil market. The US experienced a significant increase in the past decades [6].

Facing this sudden issue, countries have been negatively affected with various perspectives to some extent. As the two largest oil producers, Russia and Saudi inevitably suffered losses caused by the falling price. Since the US dollar has been closely pegged with oil prices, the US has to risk itself because the US oil production would become unprofitable whenever the price per barrel drops below $ 52 [3]. Moreover, the losses might be doubled for the US since it has obtained a larger proportion of oil production right before this sudden issue, as shown by Figure 1.

It is common knowledge that the oil-importing countries seem to be benefited from the relatively low oil price. Nevertheless, the pandemic made these countries incapable of taking even nuanced advantages before recovering oil demand, especially for China. The manual effects of pandemics between countries would significantly lower product demand, leading to adversity in economic recovery while China has the greatest proportion of intermediate product exporting economics [3].

Although the price war is beginning because of the sudden disagreement, the cause behind cannot simply be explained as the collision of parties with unexpected issues but the long-term underlying geopolitical problem between Russia and the USA. Some scholars indicate that the price war is planned by Russia, which turns to be revenge toward America and Saudi. Figure 1 illustrates the most reasonable explanation: the USA's increasing proportion of the oil market has intensified the dissatisfaction of Russia. Although the antithesis of countries would be a long-term problem that could not be solved overnight, it is believed that this price war would not last too long. Since the price war is generally negative in most aspects under the pandemic, it is believed that sudden issues like this would not last for a long time no matter if it was initially stimulated either geopolitically or financially.

3. CRUDE OIL FUTURES IN DERIVATIVE MARKETS: THE FAILURE OF YUAN YOU BAO

Contemporarily, crude oil futures thrive in their original markets as well as other markets. While crude oil futures become more and more popular around the world, the demand for direct or indirect investment into them stimulates the formation of the derivative markets. On this basis, some tools are offered to provide investors with better accessibility to the international market of crude oil futures. In this field, common factors, e.g., surplus and shortage in crude oil storage, do play an important role in pricing. However, multiple new factors should also be considered to create a better picture of the field.

Starting from January 2018, the Bank of China (BOC) has opened a derivative financial product, Yuan You Bao, which is linked to WTI oil futures traded in Chicago Mercantile Exchange. On April 22nd, 2020, after the price of the futures dropped below 0, BOC confirmed the validity of the price and did not close their clients' positions until the price became $-37.63. Most investors of Yuan You Bao suffered great losses. In this case, the outcome cannot be fully explained by the poor performance of the crude oil market. To understand the event and prevent potential loss generated by similar situations in the future, one has to understand the features of the derivative market of crude oil futures.

Essentially, Yuan You Bao does not help its investors access WTI futures in CME directly. For this financial product, BOC has its position in CME through an international investment bank. Back to China, it makes its market of crude oil futures locally, targeting domestic investors. One of the main differences in this scenario compared to entering a position in CME is that investors do not buy futures in the same unit. Yuan You Bao provides a single unit as small as 10 barrels, while the number is 1000 in CME. In other words, investors of Yuan You Bao do not trade in the international market really and BOC is not purely retailing crude oil futures contracts. Hence, any trades in this derivative market do not affect the price in CME directly.

Starting from April 20th, the price of the futures started to fall to negative. With a negative price, investors lose all their margin and need to fill the per-unit gap below 0 up. The essential reason can be attributed to a global event, e.g., the trade war initiated by Saudi Arabia as well as the travel bans around the world in response to the pandemic put stress on crude oil storage, discouraging investors from keeping their long position. Nevertheless, in this case, a dangerous but reasonable financial phenomenon and environment are not enough to cause the great failure of Yuan You Bao. Fig. 2 is the price and trade volume of WTI crude oil futures on the day it dropped to negative [7] illustrated by the financial report of Xueqiu. Interpreting the trend, Bu Hui and his colleagues discuss one of the key problems causing the failure in their piece of work [8]. According to their statement, one of the main factors that caused dissatisfaction from the investors is that there was a disconnection between the price fluctuation and the market opening time of Yuan You Bao. At 14:30, April 20th EST, the price of WTI2005 had already dropped to $-36.37, which closed at $-37.63. However, the closing time in China on April 20th is 22:00, 4.5 hours before investors could respond. Besides, after the negative price occurred, CME changed its standard Black–Scholes pricing model to the Bachelier model to adjust for the negative price. BOC then locked down the trade of Yuan You Bao for 24 hours to check the validity of the price, as they announced. Consequently, its investors had to pay for the negative price gap even when their margin had already depleted for not closing their position on time.

Figure 2 The price record for WTI2005 from 18:00, April 19th, 2020, to 17:00, April 20th, 2020 [7].

As a matter of fact, Ref. [8] reveals a risky feature of the derivative financial market of crude oil futures: time lag. As investors of this field are not participating in the international crude oil futures market directly, they have

to take the risk of losing their positions, not on time when a similar unprecedented event happens. Since rules could change inside and outside the original clearinghouse in response to the unusual phenomenon, like what CME and BOC did, investors will face a higher risk using derivative financial tools to access the international market.

Specifically, in the case of Yuan You Bao, the time lag is not the only reason. In Yuan Zixuan's paper, he argues that BOC was not adopting their optimized solution [9]. In contracts with its customers, they agree that their position will not be closed at a percentage until maturity. For many tools and contracts, investors' positions will be canceled at the line of 20% margin. The overconfidence in its crude oil futures market, which is one of the most volatile markets. Besides, the lack of risk valuation in advance contributed to the disaster of Yuan You Bao [9]. Admittedly, investors could track the trend of price. Whereas, in an extreme situation like this, the amount of cash the investors of a derivative product could save depends on the producer.

For circumstances like the negative price crisis, there could be solutions to eradicate problems or at least improve future derivative products. Wu Qiong discusses the status of financial tools, like Yuan You Bao, in China [10] to investigate the most efficient and secured approaches of using international derivative financial products. While China's financial market is still developing, it lacks a legal system and regulations for such an innovative product. BOC simply attracted its clients with such a degree of freedom by assuring them that the risk is fully under control, while it did not even get prepared for the price shock [10]. Objectively, the failure of Yuan You Bao boosts the development of the regulation on the financial market in China. With stricter rules, both investors and banks need to consider more factors to hedge risks while earning profit. Legal regulation could also help with problems such as the limitation for the level of closing a position.

4. THE SUEZ CANAL OBSTRUCTION

When it comes to natural causes, the Suez Canal obstruction [11] is one of the most unpredictable and irresistible cases. On March 23rd, 2021, the container ship Ever Given encountered a strong sandstorm, which resulted in the ship turning sideways and blocking the canal [12]. The number of ships blocked accumulated to around 400 in total through the canal from both directions for the next few days. The blockage remained until March 29th, 2021, when Ever Given was re-floated and transportation resumed. During this period, the global supply chain had been severely affected. Crude oil prices hence experienced a strong increase since the obstruction took place as displayed in Fig. 3.

Figure 3. OIL(WTI) price from August 2020 to July 2021 [13].

The Suez Canal begins its operation in 1869 and serves as one of the world's most important trading routes connecting Europe and Asia [14]. More than 10% of global freight passes through this canal on a daily basis. Its commodity range varies from cattle to crude oil. Although it features the essential artery across continents, its width of 205 meters places a hidden danger. When the canal was blocked by the ship Ever Given, a crucial connection between crude oil wells in the Middle East and factories in Europe and the United States was cut down. Thereby, the obstruction triggers a shortage of demand in crude oil supply. Since March 23rd, the market had been speculating on the price of oil. When the news reported that the canal would not resume operation in weeks, it stimulated public anxiety about factories maintaining regular production. AlFadhli, et al. take a deep study on the impact of the Suez Canal obstruction on crude oil price [15], and the results of actual return are summarized in Table 1. They applied both a mean-adjusted model and a market model to compare the difference in price prior to and post the blockage. Inside the estimation window (indicating the crude oil price during the blockage), both models aim to find the abnormal returns by subtracting the average return by the expected return due to the incident. They also observed that the crude oil prices increased by 6.861% on the first day, then the increase rate slowed down in the following days. A comparison between the abnormal returns and the actual increasing returns is made, and the regression model indicates a difference. Hence it draws the conclusion that the obstruction results in a great increase in the crude oil price since the start of the event, albeit the increasing trend slows down later.

Table 1. Actual Return on Crude Oil Prices [15]

Number of Days	Pre	Post
5	-1.151%	1.016%
3	-1.514%	1.918%
1	0.212%	6.861%

As the Egyptian Suez Canal Authority claims, the Ever Given incident can be a combination of natural and technical errors. In terms of risk management, such events are called black swans symbolizing their low possibilities. According to financial analysis, a black swan event has the feature of "an extreme, surprising event relative to the present knowledge" [16]. Its unpredictability is the main factor that causes the price to fluctuate. Besides, the panic accompanying the events also leads to higher price changes towards one side. Therefore, the obstruction clearing traffic flows is a black swan that brings unforeseen delays on the global supply chain. Other scholars investigate the price change of crude oil and find that it increased by four percent just on the next day [17]. Their study collected data from European firms to evaluate the Corporate Social Responsibility scores on various commodities blocked by the Ever Given incident. During the time slot between March 23rd and 25th, they conducted a cross-sectional regression model to assess different goods' price risks. By comparison, they conclude that oil price-sensitive firms underwent more risks during the set event window. Subsequently, it states that crude oil is one of the products that fluctuated the most during the blockage. In the scale of a global market, even such a brief interruption of supply can result in a great price increase one day.

Alternative trade routes are feasible solutions to alleviate losses to such a random incident. Conventionally, container ships traveling from Europe to the far East can choose to cruise across the Cape of Good Hope through the African route. However, compared to the Suez Canal route, its arrival time would be delayed for 9 to 10 days. In this case, shipping through this passage is inefficient and would negatively affect the crude oil price unless the occurrence is like the case of Ever Given. In addition, the Northern Sea Route (NSR) through the Arctic Ocean can undertake certain traffic flows from the normal routes. Despite particular disadvantages due to ice periods and fuel consumption, the NSR comprises an enormous distance convenience in summer [18]. Therefore, a combination between NSR and SCR (Suez Canal Route) is proposed to outclass the traditional single trade route plan. The NSR-SCR scheme also intrigues more as a shipment option when the crude oil price is high. Lee and Wong provide a different perspective of solution as to regulate communication along the canal [19]. They propose to widen the channel and limit future vessel speed, length, etc.

Moreover, legal actions to routinely check the conditions of passing ships are also called. Although events like this blockage are inevitable from the side of natural disasters, technical and human errors can be eliminated through regulations. As the most uncontrollable crude oil price change, black swan incidents can cause price fluctuations out of investor expectations. To sum up, events like the Suez Canal obstruction are naturally caused, which human intervention is the key to prevent catastrophic consequences on crude oil prices.

5. CONCLUSION

In summary, this paper demonstrated three sudden issues that led to significant oil future price reduction and even further financial collapse in recent years. These selected issues were happened in different areas and countries, indicating the important global economic status of oil prices. This article identified that underlying risks in financial and political constructions would be the unconscious causation for these ostensible uncontrollable sudden issues. In other words, sudden variations of accidents can only be the catalyst but not the intrinsic of these tragedies. Implementing more strict and comprehensive regulations based on the experiences could lighten or even eliminate the crush of similar unexpected situations. Although regulation can never be perfect, the prediction method and resolution speed will reduce the wideness and deepness of unnecessary losses. These results offer a guideline for further regulation amendments of the crude oil market and effective treatment methods for future analogous issues.

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