

Derivatives Accident: The Crude Oil Treasure Incident Research

Jing Jin *

School of Economic and Business, Monash University, Melbourne, Australia

*Corresponding author: jjin0027@student.monash.edu

Abstract. The price of the WTI2005 crude oil futures contract was concluded at -37.63 US dollars per barrel on April 20 at US Eastern Time. This is the first negative price of WTI crude oil since it was listed on the Chicago Stock Exchange, causing vast losses to the Bank of China and crude oil treasure investors. In order to avoid similar accidents in the future, both internal and external risks need to be evaluated. The Bank of China is primarily accountable for the accident as the seller of the crude oil treasure due to its blatant incompetence in regard to the company's products, sales, risks, disclosure, supervision, and internal controls. However, external factors including COVID-19, the Organization of the Petroleum Exporting Countries, the CME Clearing, as well as regulators and consumers of crude oil treasure actually have some obligations thereby providing suggestions to banks, regulators, and investors. This study is vital for the use and regulation of derivatives in light of the rapidly expanding and developing financial sector in China.

Keywords: Crude Oil Treasure; Bank of China; Negative Price.

1. Introduction

On account of the liberalization and globalization of the economy worldwide, financial markets continue to digitize and innovate. Nevertheless, several Chinese banks have begun offering a string of derivative products as a result of China's foreign exchange controls and the prohibition of private trading of futures. As a preferred indicator of world oil prices, WTI crude oil futures appeal to considerable investors. Hence, in January 2018, the Bank of China issued the crude oil treasure, which provides book-entry crude oil products for domestic individual investors, including American West Texas Intermediate crude oil futures contracts mentioned above and British Brent crude oil futures contracts [1]. There are mainly three modes of trading the crude oil treasure: (1) Trading on the crude oil treasure is available in USD and RMB. (2) Each crude oil treasure product is named using the combination of transaction currency plus transaction type plus reference contract code. (3) The crude oil treasure is a product of account transactions, so crude oil cannot be extracted physically. (4) The crude oil treasure can conduct business through Bank of China online banking or the E Ronghui APP. (5) the crude oil treasure requires a 100% margin that is, no leverage service is provided. (6) The crude oil treasure can be used for both long and short transactions. (7) Regarding the crude oil treasure trading, one barrel is the starting point, and 0.1 barrel is the minimum incremental unit. (8) Trading on the crude oil treasure is done using a T+0 mode, which means that multiple transactions can be executed in a single day, and transaction funds are calculated in real time.

However, on April 20, 2020, US time, WTI crude oil futures posted a negative settlement price of -37.63 US dollars per barrel for the first time since it was listed on the Chicago Mercantile Exchange, causing a loss of no less than 9 billion RMB [2]. After that, more than 60,000 investors in the crude oil treasure filed lawsuits to defend their rights. There is a heated debate among the public as to who should be responsible for the crude oil treasure mishap. Currently, most research examines the reasons for the crude oil treasure's wearing incident from the perspective of the Bank of China, but few have comprehensive analysis. But as a matter of fact, this is of crucial significance to prevent has derivative accidents. It also serves as a reference point for how individuals and institutions can take advantage of derivatives, as well as how regulators can enhance their oversight of derivatives. This essay will initially outline the timeline of the crude oil treasure mishap.

Subsequently, evaluating the causes behind the crude oil treasure incident. The corresponding recommendations will demonstrate on the operation of derivatives from three perspectives including

the Bank of China, consumers, and regulators in the third part. Ultimately, a summary and outlook for research will be illustrated accordingly.

2. The Crude Oil Treasure Accident

In the case of the crude oil treasure event, the contract where the accident occurred was the WTI May futures contract, with product code CLK20. Figure 1 displayed the Bank of China crude oil treasure account ceased trading and commenced moving positions on April 20th, at 22:00 Beijing time. Oil was priced at \$11.7 per barrel at this time. While on the morning of April 21, the average price was -\$37.63 per barrel between 2:30 and 2:28. This is the first time that WTI crude oil futures in the Chicago Mercantile Exchange has a negative settlement price after its listing. On the same day, the Bank of China halted trading in U.S. crude oil treasure products for one day. On April 22, the Bank of China pointed out that the American contract for crude oil products had been settled or moved to -\$37.63 per barrel. This bank and the China Construction Bank both issued notices suspending the opening of crude oil futures starting today. In addition, the regulatory authorities require the Bank of China to self-evaluate product risks and submit reports on their self-examinations [3].

On April 23, the Bank of Communications also released a notice to stop the new opening of book-entry crude oil products. Meanwhile, the Bank of China's stock market plunged precipitously, losing nearly 15 billion RMB in a single day. On April 24, the Bank of China proclaimed a second response, noting that it intended to carry out a comprehensive review of product design and risk management. The Shanghai Pudong Development Bank, the Industrial and Commercial Bank of China, and the China Construction Bank suspended the opening of an array of futures positions on the 27 and 28.

Bank of China declared on April 29 that it would assume responsibility under the legal framework and then urge CME to investigate the reasons for the abnormal price. On April 30, the China Banking and Insurance Regulatory Commission supervised the Bank of China to tackle issues in accordance with laws and regulations and protect the legitimate rights and interests of financial consumers. On May 4, a meeting of the Financial Committee of the State Council laid emphasis on the inherent risks of financial commodities posed by commodity volatility [4]. As of May 5, the Bank of China announced a settlement plan under which the bank will undertake all negative price losses and compensate 20% of the deposit amount [5]. On July, 27 provincial high courts in China published that they would consolidate jurisdiction over civil litigation cases involving crude oil treasures. An announcement released in December stated that CBIRC fined the Bank of China and its branches 50.5 million RMB, and fined four individuals responsible for the Bank of China a total of 1.8 million RMB [6]. Eventually, after waiving the security deposit, these consumers just received 20% of their principal back. While this incident inflicted a hefty 9 billion RMB loss.

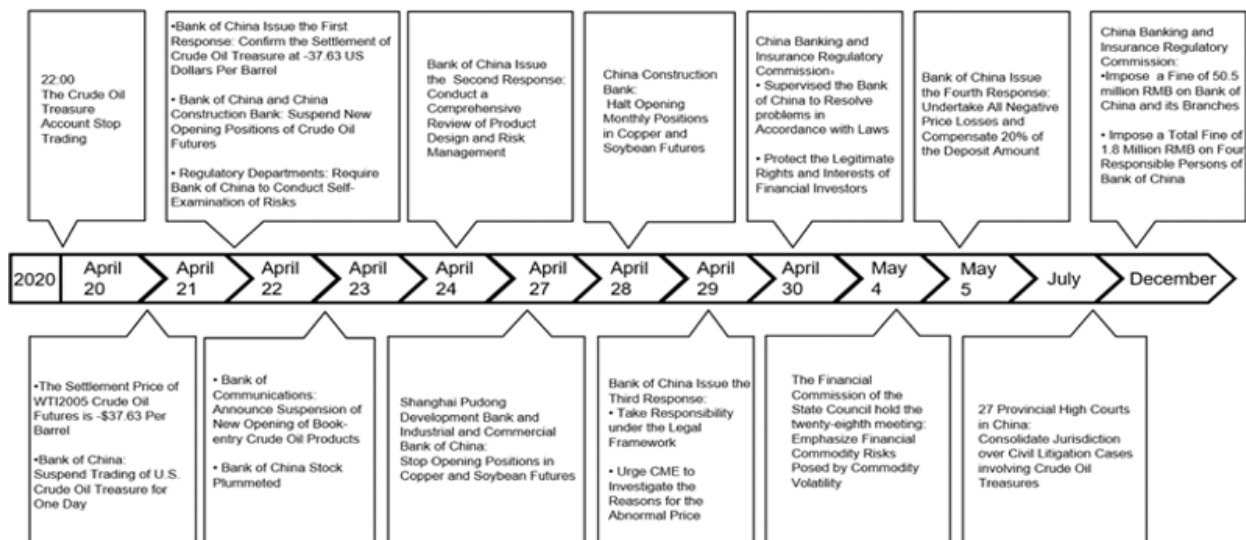


Fig 1. Crude Oil Treasure Accident Timeline (Beijing Time).

3. Reasons for Incident

3.1 Coronavirus Disease

In early 2020, the outbreak of COVID-19 led to a worldwide economic slump. A forecast by the International Monetary Fund indicates that global growth will be -4.9% in 2020 [7]. That gives rise to a great diminishing of people's purchasing power. There is a sluggish development in the crude oil industry, and the global oil demand is close to 9 million barrels per day lower than in 2019 [8]. Furthermore, crude oil inventories continued to rise and once exceeded 85% of storage capacity, as shown in Figure 2. Producers are confronted with the challenge of storing crude oil while consumers may need to obtain real crude oil at the expiration of their contracts. Futures contracts for WTI crude oil must be carried out free of charge on board any pipeline or storage facility in Cushing, Oklahoma, using Enterprise, Enbridge, or Plains pipelines [9]. Buyers may pass an Interfacility transfer, in-line transfer, or in-tank transfer to make delivery. At that time, the Cushing storage pipeline was almost fully booked by traders. There were basically no warehouses to store oil, which rendered physical delivery difficult. To avoid physical delivery, investors who cannot participate in the delivery must close or close their positions as soon as possible to ensure that the crude oil is still in the oil depot of the exchange [10].

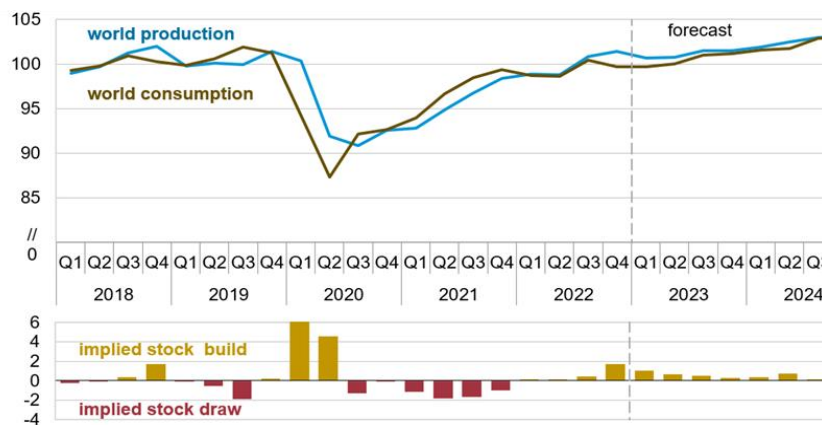


Fig 2. World Liquid Fuel Supply and Demand (Million Barrels Per Day).

3.2 OPEC+

As outlined above, the stagnation of global production activities and the blockade of transportation have contributed to a remarkable decline in global crude oil demand. Thus, the Organization of Petroleum Exporting Countries developed a response plan in early March 2020, with the objective of reducing supply in order to maintain prices stable [11]. On March 6, however, Russia strongly objected to it since crude oil exports control its economic lifeline. The reduction in crude oil production will not only affect its domestic price level but will also benefit its competitor, the United States, which has not reduced its production of shale oil. On the 8th, Saudi Arabia announced that it would lower oil prices and decide to raise production, triggering turmoil in the oil market. Since the cost of producing oil in Russia and Saudi Arabia is much lower than that of the United States, part of the reduction in oil prices will still benefit the former but be a disaster for the latter. Obviously, on March 9, the global stock market experienced Black Monday and the American stock market triggered the second circuit breaker in history [12]. Similarly, U.S. West Texas Intermediate crude fell 32.3% to \$27.40 per barrel [13]. After that, on March 12, March 16, and March 18, the U.S. stock plummeted further and once again reached circuit-breaker levels. In such an adverse market surrounding, the crude oil treasure suffered vast losses in the following month.

3.3 CME Clearing

The CME Exchange bears an unavoidable responsibility for negative price movements. On April 8, CME proposed modifying the option pricing model to ensure normal market operation [14]. If the

WTI crude oil futures price settles between \$ 8 per barrel and \$ 11 per barrel in any month, CME Clearing will convert its pricing and margin options model from the existing model to the Bachelier model. If any WTI crude oil futures settlement price falls below \$8 per barrel, CME Clearing will switch to the Bachelier model for all WTI crude oil options contracts and all related crude oil options contracts, effective the following trading day. On April 15, trading rules were further revised for CME, allowing contracts to be settled at zero or negative prices [15]. There is no doubt that a chain of CME policy measures has distorted futures prices to some extent, even though this accident was caused by the irrational behavior of the market. The consequence is the WTI crude oil price settled at a negative value on April 20, as presented in Figure 3 [16].



Fig 3. West Texas Intermediate Crude Oil Spot Price GMT (Dollars per Barrel).

3.4 Investor

Having such a large number of investors is also one of the main reasons for the massive losses. There are over 60,000 clients with the Bank of China investing in the crude oil treasure, including about 20,000 investors with less than 10,000 RMB, about 20,000 investors with 10,000 to 50,000 RMB, and about 20,000 investors with more than 50,000 RMB. There is the bulk of investors who lack professional knowledge and believe blindly that the crude oil treasure is a profitable investment. Additionally, novice customers lack a thorough understanding of the rules and are unaware of the high stakes. As soon as they recognize this, they will know the contracts traded near the delivery month have poor liquidity, so there is a risk of being unable to liquidate the position. In contrast, they remain bullish until the end of the trading day during which they held the position. Furthermore, Consumers were not paying attention to CME's notice of the possibility of negative prices. It is even more alarming that massive investors have flocked to the crude oil treasure platform in order to buy crude oil at rock-bottom prices. The one-sided surge in long positions even soared to 95%, breaking the long-short balance. Meanwhile, the Bank of China established a huge risk exposure on the Chicago Mercantile Exchange to hedge the excess risk exposure. Furthermore, due to the early disclosure of transaction information, a large number of long positions encountered a terrifying attack from short positions, causing short squeezes.

3.5 Regulator

Another pivotal contributor to this black swan event is regulatory neglect. According to the announcement of the State Administration of Foreign Exchange, commercial banks, securities firms, fund management firms, insurance companies, trust companies, and other qualified investors may invest their own or raise funds in foreign markets and products that are allowed by regulators and relevant departments [17]. The foregoing rules are definitely broken by the crude oil treasure, which is clearly not fundraising but an indirect personal investment in foreign futures. However, the regulatory authorities did not require rectification or cancellation of the crude oil treasure. In

accordance with Article 18 of the Interim Measures for the Management of Financial Institutions' Derivatives Trading Business, banking financial institutions are not permitted to hold or sell naked short-selling derivatives to customers that may engender limitless losses, as well as re-derivatives that use derivatives as underlying assets or linked indicators product [18]. But it is undeniable that crude oil treasure has evolved into a financial derivative that might inflict catastrophic losses ever since the Chicago Mercantile Exchange permitted negative price sales. The regulatory bodies did not discover issues such as inappropriate product design, non-compliant sales tactics, confusing product terms, excessive product risks, or irregular performance mechanisms during the approval and regulation procedure. Instead, the Bank of China was not punished until after the wearing accident.

3.6 Bank of China

The Bank of China opened a large account and simulated a virtual trading board to sell the crude oil treasure product. In other words, the Bank of China's crude oil treasure only provides a trading channel. The investment choice is determined by the investors themselves. If the price of crude oil futures rises, the profit of the Bank of China is equal to the loss of the short position minus the profit of the long position plus the handling fee and the exchange rate difference. If the price of crude oil futures falls, the profit of the Bank of China is equal to the profit of the short position minus the loss of the long position plus the handling fee and the exchange rate difference. To be exact, the Bank of China will divide the bulk commodities for professional investment institutions in the United States, namely 1,000 barrels of crude oil per contract, into smaller commodities suitable for amateur retail investors, namely 1 barrel of crude oil per contract, all of the positions will be held under the bank's name. In addition, The Bank of China participates as a market maker for Crude Oil Treasure on the OTC market, offering quotations, risk management, and clearing services, as well as acting as an investor in the international futures market in WTI crude oil futures market, hedging net position risk. As described in Figure 4, the investor opens an account with the Bank of China and issues an opening, closing, or transferring order for a long or short position. Subsequently, the Bank of China calculates the position based on the difference between opening and closing netting, submitting it to the CME via the TAS command. On a daily basis, the CME quotes WTI crude oil futures contracts. Ultimately, the Bank of China splits and settles the individual in accordance with the actual transaction price.

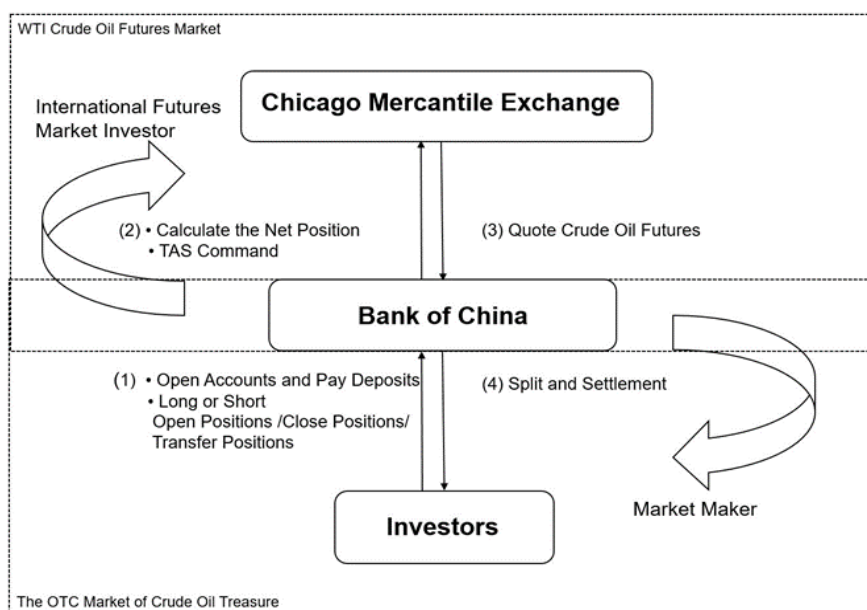


Fig 4. Crude Oil Treasure Transaction Process.

3.6.1. Product Nature

The unclear nature of the crude oil treasure is detrimental to managing and monitoring. To begin with, the U.S. Supreme Court established four standards based on the Howey Test to assess whether

an investment contract exists, including (1) A monetary investment (2) In a common venture (3) With a target to gain profit (4) To result from the efforts of others [19]. As the crude oil treasure does not invest in a common enterprise and is not solely the result of a third party's efforts, it is not a securities derivative. In the second place, no leverage is used in crude oil treasure trading. It is simply tied to international futures contracts. There is no way to withdraw tangible items from crude oil treasure products. Moreover, the crude oil treasure is not a standardized contract. Thus, it not belongs to future products. Thirdly, investors do not entrust the Bank of China with managing and investing capital when they invest in crude oil wealth. Furthermore, the crude oil treasure in the Bank of China is regarded as a margin trading business under the commodities category, so it is not a wealth-managed product.

As stated above, the transaction is divided into internal and external transactions. The former is the crude oil treasure transaction between the Bank of China and domestic investors, and the latter is the WTI crude oil futures transaction between the Bank of China and the Chicago Mercantile Exchange. Therefore, Crude Oil Treasure is a purely domestic over-the-counter derivative transaction. Based on Article 4 of the Interim Measures for the Administration of Derivatives Trading Business of Financial Institutions, the derivatives trading business of banking financial institutions are divided into hedging derivatives transactions and non-hedging derivatives transactions. Among them, non-hedging derivatives transactions consist of client transactions, market-making transactions, and proprietary transactions. Crude oil treasure is a market-making transaction in non-hedging derivatives transactions. In short, this essay considers that the crude oil treasure is essentially an OTC standardized derivatives contract and a re-derivative product linked to derivatives.

3.6.2. Product Design

The settlement date set by the Bank of China was too late, which prevented it from escaping the plunge in crude oil prices. The third business day before the 25th day of the month prior to the delivery month is the last trading day for WTI crude oil futures contracts [20]. Since April 5 is a Saturday, the WTI2005 futures contract should expire on April 21. At this point, the futures price converges to the spot price of the underlying asset, allowing for maximum integration with the global oil market. Additionally, this measure gives investors ample trading discretion. Nevertheless, the product exposes poor liquidity and high uncertainty accordingly. The price of crude oil storage around the delivery date is extremely high. The price of the crude oil storage futures contracts surged, so the Bank of China had to forcefully liquidate the crude oil treasure account regardless of the cost.

BOC is also unprofessional when it comes to margin closing times. There is a considerable danger of price swings since the trading period between China and the United States cannot be completely covered. Crude oil treasure is open for trading from 8:00 to 22:00, Beijing time [21]. After 2:00 to the market opening of the next day, customers will not be able to trade. WTI crude oil futures are traded from 20:00 to 18:00 the next day, New York time [22]. The time difference between Beijing and Chicago Stock Exchange is 14 hours, which means that when the Bank of China closed the margin account at 10 o'clock Beijing time in the evening on April 20, 2020, the US market had just started trading. Investor accounts are frozen during this period, they could only watch crude oil prices fall into negative territory, which led to the failure of the Bank of China to rollover.

There are doubts as to why the Bank of China does not adopt the price at the time of position transfer but rather settles at the lowest price. It is attributed to the Trade at Settlement order, which allows traders to declare the purchase and sale of futures contracts during specified trading hours, based on the increase or decrease in the settlement price of the futures contract [23]. The Bank of China pre-locked the futures settlement price from 2:28 to 30 am on April 21, Beijing time, theoretically, there would be no risk exposure to customers. No matter how much profit or loss a customer makes on the crude oil treasure, the Bank of China will generate exactly equivalent but reverse profit and loss on the CME exchange, thereby offsetting each other. On the surface, it seems that the Bank of China's losses on the futures side can be smoothed out through the profits of the crude oil treasure. The problem is that in the crude oil treasure accident, the funds in the account were

not able to compensate for the Bank of China's losses on the futures side, since not only the principal was lost, but also a substantial security deposit was owed.

3.6.3. Sales Management

There has been a one-sided or exaggerated sale of crude oil treasure by the Bank of China. WTI crude oil futures trading has high requirements for professionalism and risk-taking. But the Bank of China declared that "crude oil is cheaper than water" and advertised the crude oil treasure as a low-risk investment with stable returns. This is patently misleading and violates the basic requirements of investor suitability. Additionally, in the sales process, the Bank of China still has issues such as selling products to customers who do not meet the age requirements and selling them in the form of gifts.

3.6.4. Information Disclosure

The Bank of China failed to comply with its obligation to disclose risks. Since the revision of the CME rules, the crude oil treasure has become a business with the risk of liquidation, but the Bank of China has not taken any risk-reducing measures, such as moving positions in advance and modifying the product investment ratio. While the crude oil treasure continues to be delivered according to the original settlement method and time. Additionally, the bank failed to inform its consumers of the possibility of negative price, breaking the Interim Measures for the Management of Financial Institutions' Derivatives Trading Business. Afterward, the crude oil treasure transaction agreement only just mentioned the possibility of losing the investment principal but did not explain the risk of indemnification of the product. In fact, the bank has an obligation to inform not only during the sales process but also throughout the cycle. This includes disclosure of earnings performance and major events.

3.6.5. Risk Assessment

In terms of risk assessment and management, the Bank of China is not prudent. The risks of wealth management products are divided into R1 (cautious), R2 (steady), R3 (balanced), R4 (aggressive), and R5 (aggressive) from low to high [24]. The Bank of China sets the crude oil treasure as R3, which enables clients to obtain certain income with less risk, but does not guarantee repayment of the principal. However, after the release of negative oil price information, the Bank of China did not adjust the risk to R5 and reminded customers to sell positions in time. Moreover, there are flaws in the market share setting and trading system functions of the crude oil treasure.

3.6.6. Supervision

The Bank of China does not closely monitor margin accounts. When the margin system was first implemented, it was primarily aimed at short investors, since long investors are not affected by liquidation when there is no negative market price. Nevertheless, there is the possibility that crude oil prices will decline after the CME's new rules come into effect. The crude oil treasure generally performs forced liquidation of all open positions of its customers when the margin adequacy ratio of long position investors falls to 20%. This is done according to the principle of a single loss ratio, from large to small, until the margin adequacy ratio reaches 20%. In those instances, in which the customer's account balance was insufficient to maintain their positions, the Bank of China did not remind the customer via APP, SMS, or telephone, nor did it carry out the corresponding compulsory liquidation process. Although the Bank of China explained that this was an accident that did not occur during trading hours, it was an obvious risk management loophole.

3.6.7. Product and Internal Control Management

Prior to the launch of crude oil treasure, the Bank of China did not carry out a stress test that is relevant to product management. Furthermore, the margin clause is not apparent and the product evaluation is not objective. In regard to internal control management, unreasonable performance appraisal and incentive mechanisms can easily make salespeople conduct illegal sales. Furthermore, the Bank of China did not cover private product sales in the global marketing department, nor protect the rights and interests of consumers.

4. Suggestions

4.1 Advice to Clients

Consumers also need to understand basic investment knowledge, such as risk management and market analysis, so that they can better grasp the timing and control risks. So as to avoid being misled by the words of the salesperson, investors should carefully review the product contract, including the product mechanism and investment value. When investors participate in products linked to overseas asset prices, they need to choose suitable commodities based on their own professional capabilities. Novice traders are not recommended to invest in high-risk derivatives. Consumers should be cautious in investing in leveraged products, especially some may lead to the risk of short falling principal and posting margin. It is necessary to keep data and news up to date in order to buy and sell in a timely manner. Never switch from being a hedger or arbitrageur to being a speculator, as the risk of betting on the market is prohibitive. Clients should diversify their investments as much as possible, so that risks can be spread to the greatest extent.

4.2 Advice to Regulators

Supervision departments should require financial institutions to conduct necessary investor education and expand the financial knowledge of their customers to assist them to make sensible investment decisions. Regulatory authorities need to strengthen their review of derivatives, especially financial instrument innovations that are suspected of circumventing supervision. For instance, financial institutions may need provide more information on product positioning, operations and risks. Regulatory agencies need to further improve market rules and increase risk limits and margins to curb risks. Regulators also need more public market information to guarantee market transparency and fairness. It is necessary to further boost the integrated supervision system of the financial market and carry out bilateral and multilateral cooperation to enhance the efficiency and capacity of cross-market supervision. In the event of a major accident, the regulatory authorities should intervene timely to ensure that investors' legitimate rights and interests are maximized when they suffer losses. Regulatory departments should also strengthen the punishment of violating institutions and rectify unhealthy phenomena in the market.

4.3 Advice to Bank of China

In comparison with other banks, the Bank of China lacks professionalism in the design of the crude oil treasure. It needs to optimize the transaction time, date, and method. Strengthen the training of sales personnel, so that employees have a thorough understanding of their products. Afterward, they can use simple language to illustrate the possible risks of products during sales for clients. The Bank of China can conduct a comprehensive analysis of investors before sales and recommend products according to customers' risk tolerance. The investor situation should be regularly reviewed, and if necessary, relevant changes should be made if the investor ability rating no longer corresponds to the current product. The Bank of China needs to modify the incentive and performance mechanism, prohibiting sales staff from deliberately hiding or downplaying risks for the sake of performance. When the transaction rules adjust, the Bank of China needs to follow up in a timely manner and carry out risk re-evaluation and re-disclosure. The Bank of China also needs to establish a sound system to monitor the entire cycle of the product. For the problem of jet lag, it is necessary to send special personnel to keep an eye on the US crude oil market. The Bank of China needs to carry out scenario analysis and stress testing on a regular basis to ensure that the product can adapt to the current market environment, and make timely revisions based on the results. The Bank of China should prepare contingency plans in advance. In the event of an accident, the contingency plan needs to be activated as soon as it occurs. Additionally, maintain communication with relevant departments and pay attention to investors' demands.

5. Conclusion

This essay conducts an in-depth discussion on the crude oil treasure's wearing incident. Firstly, there are several critical time nodes that explain the impact and consequences of the event. It can be concluded that the crude oil treasure accident was not caused unilaterally by the Bank of China but was the result of multiple factors, including COVID-19, the Organization of Petroleum Exporting Countries, and the CME Clearing. Regulators and consumers are to blame as well. A few graphs also intuitively reflect the findings of this paper. In the final part, the essay presents with recommendations for consumers, regulators, and the Bank of China. Concerning investors, it is not advisable to follow the trend and buy bottoms. They need to learn relevant professional knowledge and invest cautiously according to their own risk tolerance. In addition, consumers need timely insights into market information to make diversified investments. Regulators must improve their accountability and effectiveness by strengthening the review process, enhancing market rules, disclosing market information, and promoting market integration. Bank of China needs to boost product design, sales management, information disclosure, risk assessment, supervision, and internal control management.

The crude oil treasure mishap caused China's derivatives market to suffer both tangible and intangible huge losses. This incident not only resulted in the loss of a large sum of money but also constituted a serious blow to the trust of banks and consumer confidence as well. As China's financial market continues to deepen and access conditions continue to relax, financial innovation products are becoming increasingly popular with investors. However, due to imperfect systems and rules, the development of derivatives is still subject to many restrictions. This essay has reference significance for all individual and institutional investors and regulators.

However, the analysis is mainly concentrated on the theoretical level, lacking the test of the environment. Furthermore, the data is insufficient and may not reflect the full picture of the market. In future research, models or algorithms can be used to conduct a more systematic analysis of crude oil price changes. It is also possible to analyze the reason for the accident through more samples and data.

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