Hedging Strategies with Derivatives after 2020

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Abstract. This paper examines the changes in the futures market and how Chinese companies have hedged in recent years. As is known to all, the world has experienced lots of events, such as the COVID-19 pandemic, the Ukraine Conflict, the economic recession, and the rising interest rate in the U.S. Under the risky circumstances, the foreign exchange market and commodity futures market have shown a larger volatility. During times of global economic turmoil, the investors in the financial markets are seeking opportunities to protect their investment portfolios and assets. Historically, the futures market can be seen as a safe haven for funds, mitigating losses caused by fluctuations in stock or commodity prices through proper hedging strategies. This paper analyses what the Chinese futures and spot markets are like and how Chinese companies use hedging tools to lock profits. Then, the paper gives suggestions and prospects for futures hedging and the development of markets.

Keywords: Commodity Market, Futures, Corporate Finance.

1. Introduction

Nowadays, financial markets are more globalized and commodity futures are seen as an important part of portfolios. Futures are a kind of financial derivative that allows an investor to buy or sell an asset, such as metals, agricultural products, energy, and stock index. Futures are in the form of a contract, delivered at a specified price and on a maturity date in the future. Futures provide access to hedging risk, speculation, leverage, and arbitrage, which attracts a large number of individual investors, financial institutions, and enterprises.

Generally, there are two hedging ways. (1) Buy a futures contract to lock in a future purchase price when investors expect commodity prices to rise. By that, investors can obtain the commodity at a lower price and sell the futures contract at a locked price in the future, to offset the increase in the spot price. (2) Sell a futures contract to lock in a future sale price when investors expect commodity prices to fall. By that, investors can sell the futures contract at a higher price and buy the futures contract at a locked price in the future, to offset the decline in the spot price. Normally, there is a price difference between commodities in the spot and futures markets, which is called the basis. The formation of the basis is caused by a variety of factors, including supply and demand, storage costs, transportation expenses, seasonal demand changes, and market sentiment.

The futures market has a price discovery function, which is to determine the reasonable price of a commodity or asset through buying and selling transactions. Trading activity on the futures market reflects market participants' expectations of future market trends and supply and demand conditions, thus affecting the price of futures contracts. When buyers and sellers trade according to their own needs and expectations, the volume and price in the market are adjusted according to supply and demand, thus reaching the market equilibrium. Therefore, the price discovery function of the futures market can help market participants understand market expectations and supply and demand dynamics, and provide an effective price reference for the market.

According to the Annual White Paper on Hedging Evaluation of China's Listed Companies (2022), in 2022, there are 1,130 listed companies participating in hedging in the entity industry, and the proportion of the overall reaches 22.89%. in detail, 359 companies mentioned commodity hedging, accounting for 31.8%, 310 companies mentioned interest rate hedging, accounting for 27.4%, and 939 companies mentioned foreign exchange hedging, accounting for 83.1%.

2. The Influence of COVID-19 on Different Markets

Since COVID-19 broke out all over the world in 2020, it has had a great impact on commodity and financial market. Due to the strict management policies in many countries, global economic activities were greatly restricted, which caused lots of problems for companies. What is more, the world has gone through Energy market volatility, unlimited quantitative easing strategy by the U.S. Federal Reserve, the Ukraine crisis in 2022, the rising interest rate in the U.S., Wars in the Middle East in 2023, and so on. With the epidemic becoming more serious, stock markets in many countries had gone through a quick slump, such as China and America. On the other hand, the globalization and financialization of commodity markets lead to larger volatility and speculation, which also serve as passages for risk spillovers and volatility transmission between different commodity markets (see Figure 1 to Figure 5).

In fact, the impact of COVID-19 on the global economy is no less significant than every global economic crisis in history. There has been a stronger connectedness between commodity and financial markets than before. The volatility spillover effects between different markets are crucial to financial organizations.

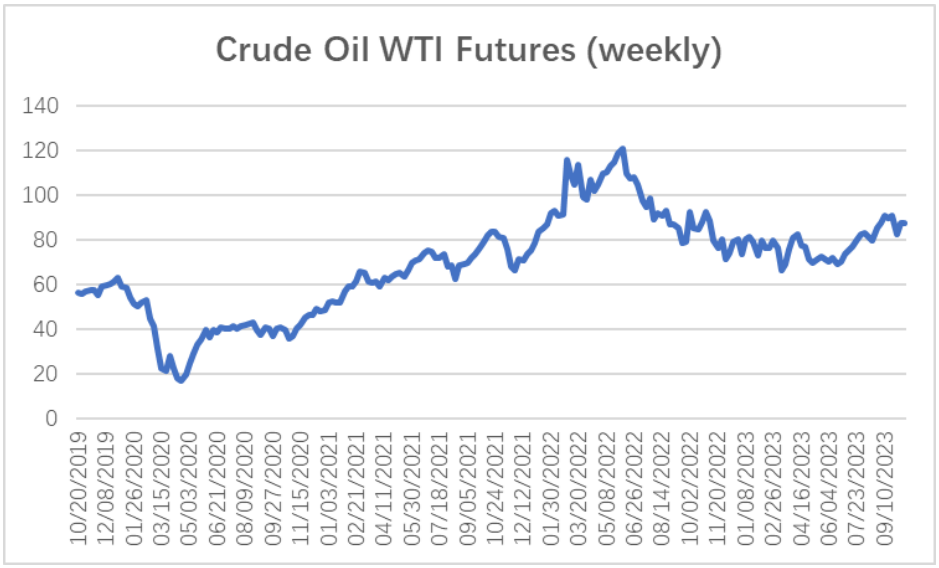


Figure 1. Crude Oil WTI Futures

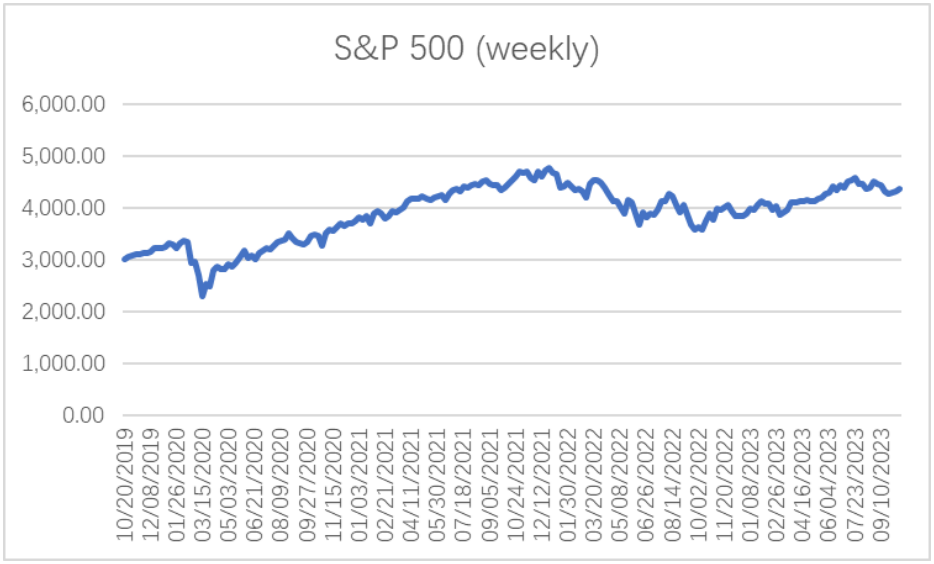


Figure 2. S&P 500



Figure 3. Shanghai Composite

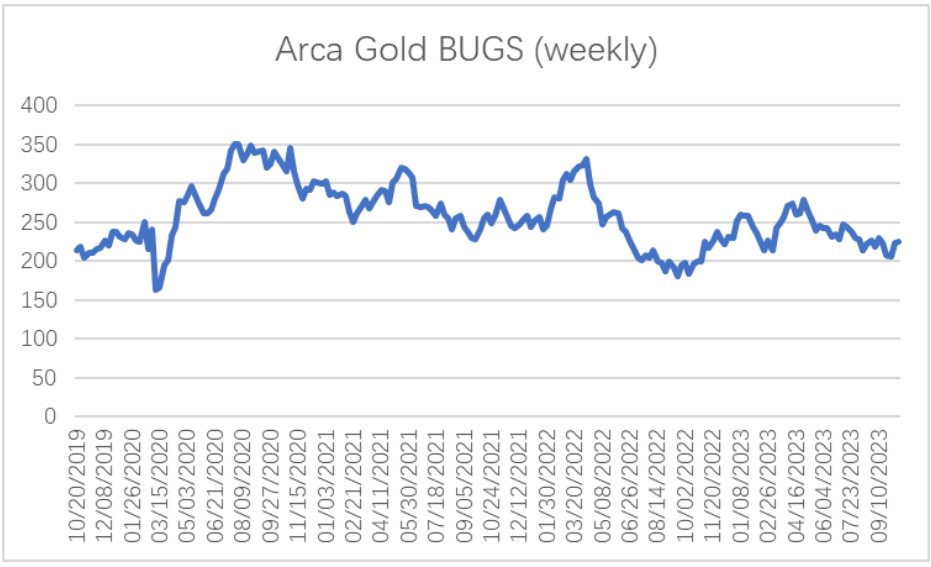


Figure 4. Arca Gold BUGS

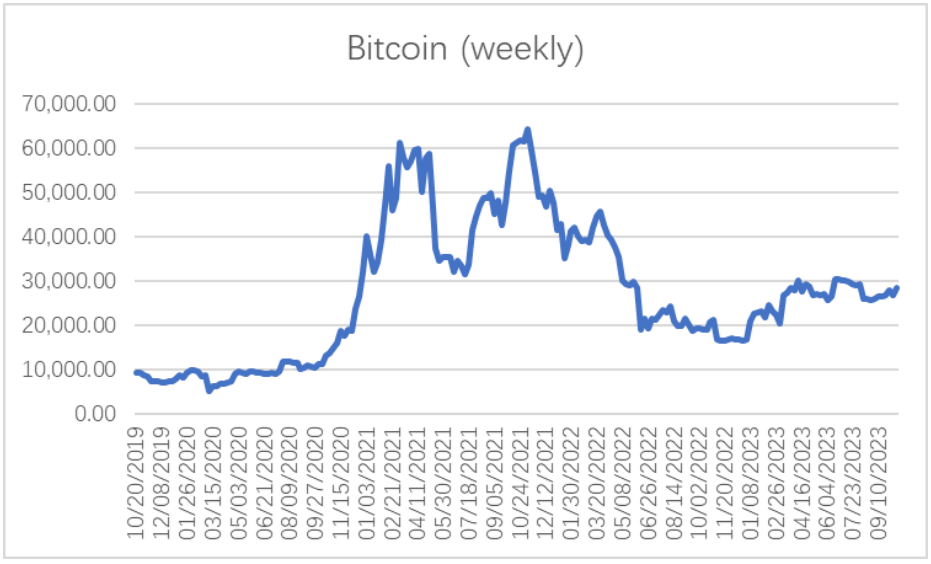


Figure 5. Bitcoin

As for the spillover effects, firstly, based on the TVP-VAR, it is found that the COVID-19 pandemic led to a stronger spillover effect between commodity, stock, and futures markets [1]. As discovered by Wang and Cheuh, in the short level, there is a positive correlation between gold and crude oil prices [2]. In the commodity market, it is found that from 1959 to 2004 commodity futures markets have a negative correlation with stock and bonds [3]. Therefore, in the past, financial organizations tended to buy commodity futures contracts for hedging. However, with a number of investors and financial organizations gradually participating in the commodity market, it is pointed out that commodity futures have become more related to the stock markets. In other words, it is more financialized and volatile than before because more hedge funds and speculators take part, which might cause problems for industrial enterprises [4].

Due to the accelerated industrialization process, China's demand for raw materials and imports is increasing. China imports a lot of metals. China is the world's largest importer of iron ore. China also produces a lot of metals. It is the world's largest producer of iron ore and the second-largest producer of copper. China is the world's second-largest oil consumer and the world's largest oil importer. As a result, the correlation between China's economy and global commodity price movements is strong. With fewer restrictions on foreign investment in the Chinese stock market, more international capital is pouring into China, which strengthens the connectedness between China and world markets. It is analyzed by the VAR-BEKK-GARCH model that the one-way return spillover from crude oil to Chinese equities is strong, but there is no reverse spillover. In addition, there is a volatile interaction between Chinese stocks and crude oil. Copper and aluminum futures are more influenced by China's stock market. There is a significant one-way return interaction between the crude oil market and China's commodity market index. For example, silver, copper, and aluminum markets are affected by oil returns [5].

3. Futures Hedging Case of Soybean Industry: Yihai Kerry Arawana Holdings Co., Ltd.

As a kind of common food, the soybean futures market is greatly affected by supply and demand. Also, the related policies of supplying countries have an influence on the soybean futures market a lot. In China, the soybean futures market plays a role in hedging against risks and preventing companies from large losses. Chinese government publishes “Central Document No.1” every year and attaches great importance to agriculture. China's agricultural products companies should not only ensure their own good management and steady development but also assume the social responsibility of maintaining the stability of the food supply. If affected by abnormal weather, and import and export trade restrictions, commodity prices will sometimes fluctuate dramatically. In order to avoid huge losses due to this fluctuation, enterprises can use futures to lock prices, aiming to achieve the purpose of hedging. After the Chinese government removed the control and test of infections in 2022, China's economy and society gradually resumed normal operation. Nowadays, China still plans to expand soybean planting areas and increase production.

Yihai Kerry Arawana Holdings Co., Ltd. is a well-known food enterprise in China, established in 1991, one of the largest agricultural products and food processing enterprises in China. Yihai Kerry Arawana Holdings Co., Ltd. is committed to providing high-quality, safe, and healthy edible oil products. They focus on product research and development and technological innovation, the use of advanced production technology and equipment, strict control of the selection of raw materials, and the quality of the production process, to ensure the high quality of products.

As for the derivatives investment, the company mainly carried out foreign exchange hedging and commodity futures hedging. Based on the data from annual reports in recent years, this paper mainly focuses on commodity futures hedging. Firstly, when this company entered the A-share GEM in 2020, the company's profits reached A high point but then declined year by year. In 2021, due to the rise in raw material costs, the company's production and operating costs were higher than the same period last year. Although the company raised the price of some products, it did not fully cover the rise in

raw material costs, and profit decreased year-on-year (see Table 1). Market competition intensification, superimposed weak consumption factors, the company's high-end retail product sales have been greatly affected.

Table 1. Operating revenue and net income (million yuan)

	Operating revenue (yuan)	Year-on-year growth	Net income (yuan)	Year-on-year growth
2022	194922	14.2%	6001	10.96%
2021	226225	16.1%	4132	-31.15%
2020	257485	13.8%	3011	-27.12%

On the one hand, the company's main suffering is macroeconomic changes. In 2021 and 2022, affected by global inflation, the Ukraine crisis, and the weather changes, the company's main raw material costs increased significantly compared with 2020. At the same time, affected by the repeated domestic epidemic, the weak economy, sluggish consumption, and other factors, the price increase of the company's products cannot fully cover the increase in raw material costs, and the gross margin of the company's main products declined year-on-year. In addition, hedging led to a decline in withholding net profit, mainly due to the loss and gain of derivative financial instruments that did not fully meet the hedging accounting requirements.

From 2019 to 2022, the operating costs of this company consist of 87.67%, 89.07%, 89.57%, and 90.54% in raw materials respectively. Obviously, the proportion of direct materials is very high. So, the risk of raw material price fluctuation is one of the biggest risks facing this company. As for the procurement of soybeans and processed products, the purchase price (Yuan/ton) is 3231, 3145, and 4734 respectively from 2019 to 2021. It can be noticed that the purchase price had increased by 50% in 2021, which greatly increased the production cost. If the hedge business was not carried out in 2021, then the company's net profits would be hit by the increase in raw material costs. This means that companies can hedge against a rise in the spot price of soybeans by buying soybean futures contracts to lock the net profits. From the company's 2022 annual report, it can be noticed that the company manufactures and processes products such as soybean and palm oil. Based on that, the company uses commodity futures to hedge. The details are illustrated in Table 2.

Table 2. Hedging details in 2022

Hedged item	Hedging instrument	Hedging mode
Risk components in inventories (imported soybeans)	Chicago Board of Trade standard soybean futures contract	Sell commodity futures contracts to lock in price fluctuations in imported soybean inventories
Risk components in inventories and unconfirmed purchase commitments (domestic soybeans)	Dalian Futures Exchange standard soybean futures contract	Sell commodity futures contracts to lock in price fluctuations in domestic soybean inventories
The price risk of inventories (the crushed meal of imported soybeans)	Chicago Board of Trade standard soybean futures contract	Sell commodity futures contracts to lock in price fluctuations in the stock of soybean meal crushed by imported soybeans
Risk components in inventories and unconfirmed purchase commitments (palm oil)	Dalian Futures Exchange standard palm oil futures contract	Sell commodity futures contracts to lock in price fluctuations in palm oil inventories
Risk components in inventories and unconfirmed purchase commitments (soybean oil)	Dalian Futures Exchange standard soybean oil futures contract	Sell commodity futures contracts to lock in price fluctuations in soybean oil inventories
Risk components in inventories and unconfirmed purchase commitments (vegetable oil)	Zhengzhou Futures Exchange standard vegetable oil futures contract	Sell commodity futures contracts to lock in price fluctuations in vegetable oil inventories

Table 3. Non-main business situation (1000yuan)

	Investment Income	fair value accounting
2022	-2289783	-1259194
2021	-1708677	866107
2020	18514	-262071

From the non-main business situation in Table 3, it is noticed that there is a big loss in investment income in 2020. In 2020, the purchase price of oilseeds and processed products increased from 5,405 to 7,024 yuan/ton, an increase of 29.95%. Wang states that this is inconsistent with the spot increase of rapeseed period expected by the company, resulting in a huge loss for the company's commodity futures hedging. Compared with COFCO, which uses corn futures in its industry, COFCO's profits from hedging have grown steadily, while Golden Arowana's has declined. In terms of operating rate variance, COFCO's operation is also more stable [6].

Rational use of cash flow: Avoid having too much not being used [6]. At the beginning of 2022, monetary funds accounted for 21.15% of total assets, which is a relatively high value. However, through the futures margin, enterprises only need to pay a low proportion of the purchase price to obtain raw materials. The company is a raw material-dependent company, through the analysis of seasonal changes and yield changes of crops such as soybeans. Secondly, the company can make use of its advantages in news channels, such as changes in international supply and marketing channels, analyze the relationship between supply and demand, reasonably predict medium and long-term trends, and execute transactions

4. Futures Hedging Case of the Oil Industry - China National Petroleum Corporation

Since the outbreak of COVID-19 in 2020, the global economy has been devastated by the pandemic, causing energy demand to plummet. On March 7, 2020, Saudi Arabia announced a cut in crude oil prices, and three days later, it announced that it would significantly increase crude oil supply. The WTI crude oil price index had even reached negative numbers as oil prices continue to fall due to the worsening COVID-19 pandemic. Then in 2022, the Russia-Ukraine war broke out, and geopolitical conflicts caused crude oil prices to go up.

There is an obvious spillover between global stock markets and the oil market. In the Chinese stock market, it is noticed that the spillover effect differs from industry [7]. For instance, the share price of oil-related companies, such as China National Petroleum Corporation and some downstream processing companies, are more related to the fluctuations in oil price. For the market risk of large fluctuations in crude oil prices, if financial derivatives are not used for hedging strategies, the cost of raw materials in the petrochemical industry will seriously affect business operations

In China, CNPC is the largest oil and chemical company. It is a state-owned enterprise with oil and gas exploration, development, production, and sales as its main business. Chinese national petroleum companies are engaged in the exploration, extraction, refining, chemical, and sales and distribution of oil and natural gas worldwide. The company has significant reserves of oil and natural gas resources and operates both within and outside China. As a major international energy company, CNPC is committed to promoting innovation and sustainable development. It actively carries out research and development and application of environmental protection technologies to promote the optimization of energy structure and the development of clean energy.

Firstly, it is noticed that the operating revenue dropped by -23.16% in 2020 (see Table 4). Actually, it is caused by the decrease in sales volume and prices of most of the Group's oil and gas products. Secondly, the 35.2% increase in 2021 is mainly due to higher sales volumes for most oil and gas products, significant price increases, and significant quality and efficiency improvements.

Table 4. Operating revenue of CNPC from 2020 to 2022

	Operating revenue (trillion yuan)	Year-on-year growth	Net income (billion yuan)	Year-on-year growth
2022	1.93	-23.16%	19.0	-58.40%
2021	2.61	35.19%	92.1	385.01%
2020	3.24	23.90%	149.4	62.08%

Since there is no specific hedging method of CNPC published, this paper makes a specific analysis and Table 5 based on Zhen's master thesis [8]. In September 2021, based on the principle of equal quantity and opposite direction CNPC bought BU1512 short orders for asphalt futures contracts on the Shanghai Futures Exchange. This aimed to hedge the risk of falling prices of asphalt inventory. If the price of asphalt falls to 2300 yuan and the possibility of continuing to fall or rise to about 2400 yuan per ton and the bullish expectation is not large, you can gradually establish a bearish position. If the spot and futures prices are weak, close the futures, take profits, and hedge spot losses. If the futures decline is large, the spot is sold. If the spot and futures prices strengthen, you can close the futures at the same time and set a good stop profit stop loss level [8].

Table 5. Profit and loss position

Date	Spot trading	Futures trading
2021/11/20	2,300 yuan/ton inventory cost	2,380 yuan/ton selling open positions
2021/11/20	2000 yuan/ton spot sales	
2021/11/27		1930 yuan/ton buy close position
Profit	-3 million yuan	45 million yuan

First and foremost, it is significant and indispensable for management to supervise the hedging department to keep away from commencing futures speculation. The company needs to set up a supervisory committee to supervise the hedge fund behavior and prohibit futures speculation. As is known to all, in 2004, there was a striking event happening at China Aviation Oil Singapore Corp, which is also strongly related to the oil industry, which moved from futures trading to more sophisticated over-the-counter oil options speculation. Finally, this company lost 550 million dollars.

5. Futures Hedging Case of the Sugar Industry - Lonkey Industrial Co. Ltd. Guangzhou

As for the sugar industry, the sugar production process is mainly the vulcanization or carbonization of sugarcane and beet. According to the National Bureau of Statistics of China, the sugar plantation area in China has decreased from 1.61 million hectares in 2019 to 1.47 million hectares in 2022. Since 2023, affected by global economic inflation, the spot market price of white sugar has risen gradually.

On January 6, 2006, Zhengzhou Commodity Exchange put forward the sugar futures. Then, on April 19, 2017, the sugar option was the first commodity option listed in China. However, after the appearance of the sugar option, the volatility of the sugar futures market didn’t change a lot (see Figure 6), which shows that the effect of inhibiting volatility is not significant [9]. Looking back at history, the trend of sugar spot according to supply and demand, can be described as a three-year bull market and a three-year bear market, so as to cycle. Based on Zhao’ research in GARCH model, VAR model, OLS model and ECM model [10]. It can be noticed that due to the large price changes in the commodity futures market, the optimal hedging ratio value after the epidemic was higher than that before the epidemic.

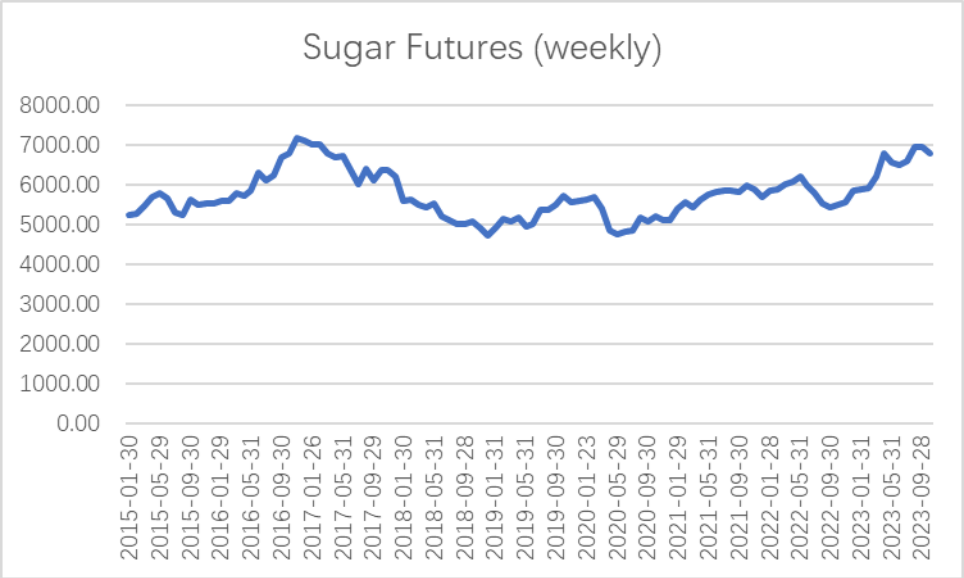


Figure 6. Sugar Futures in Zhengzhou Commodity Exchange (weekly)

The company was built in 1959 and originally was called Guangzhou Oil Chemical Plant. The main business includes daily chemical and healthy food. The representative products are mainly detergents. In addition, Guangzhou Lonkey acquired Guangzhou Huatang Food Co., Ltd. in 2019 to carry out sugar product sales.

Affected by the pandemic in 2020, the company's net income plummeted. Profit in 2021 depended on volume growth in sugar and beverage products. In 2022, according to data from the National Bureau of Statistics, the total annual retail sales of social consumer goods decreased by 0.2% compared with 2021 (see Table 6). Food and beverage revenue was 4.394.1 billion yuan, down 6.3%. Sales of household goods fell 0.7%. With the gradual recovery of the future economy and the release of consumption potential, the daily chemical and food and beverage industries still have continuous demand and development space (see Table 7).

Table 6. Operating revenue of CNPC from 2020 to 2022 (billion yuan)

	Operating revenue	year-on-year growth	Net income	year-on-year growth
2022	2.488	-3.77%	-4.716	-104.92%
2021	2.586	-22.01%	1.455	130.86%
2020	3.315	-42.30%	-0.072	-4612.81%

Table 7. Derivatives Investments (1000 yuan)

	Actual profit or loss amount
2022	/
2021	-147.8
2020	5040

In October 2023, the price of white sugar futures is close to the historical high. This paper gives suggestions on option hedging. Focus on inflection points in seasonal changes in sugar production. If sugar is in short supply and futures prices are high, the first way is for companies to short-call options, or short futures. When sugar production is hot, expect the sugar price to form a downward trend, and go long put options, or short futures.

6. Conclusion

From what has been talked about above, it can be concluded that when the economic environment becomes more uncertain and volatile, commodity markets will be strongly influenced. From the financial analysis of Yihai Kerry Arawana Holdings Co., Ltd., when the world economy is impacted

and the crude oil market changes dramatically, the hedging business may have a negative impact on the financial conditions of enterprises. As for the financial conditions of enterprises, Fauver and Derivative find that companies with agency and regulatory problems, such as inadequate regulation and low financial disclosure, show a negative correlation between Tobin Q and the use of derivatives. The investment of derivatives has a negative impact. As for the risks offset, hedging is mainly for enterprises to avoid the risk of fluctuations in raw material prices, lock in future operating profits, and protect the long-term stable operation of enterprises.

For production enterprises, increase the channels to obtain price information, avoid lag, and use the price discovery function of the futures market. Then, the investment department of the company needs to reasonably judge the price trend and adjust the scale of production. For sales enterprises, the price discovery function of the futures market can be used to reasonably predict the market price trend signal, then, determine the purchase plan. Hire an investment professional. Referring to the stock market capitalization management company, there are three aspects: strategy, risk control, and trading. Moreover, communicate with multiple futures investment organizations, and study the research reports of the futures market. For the management, they should acknowledge and accept the loss of hedging if happens, to avoid artificial bias and excessive margin, resulting in speculation. In addition, strengthens self-supervision in companies

In terms of suggestions for Exchange and Supervision, continue to improve market trading and delivery rules. Secondly, the Exchange can increase options and futures varieties, provide more useful hedging tools for sugar-related enterprises, and facilitate enterprises to counter risks. Thirdly, provide international links for businesses. For example, it can try to put forward international sugar futures, to help domestic sugar enterprises develop and compete internationally. Developing the futures, options, and spot markets contributes to competing for pricing power in the international sugar market.

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