

Analysis of the Mechanism of “Basis Pricing+Option” Mode for Feed Enterprises to Avoid Raw Material Price Risk -- Taking Haid Group as an Example

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Abstract. In 2020, the outbreak of COVID-19 epidemic impacted the corn supply. Louis Dreyfus Group, together with Haid Group, conducted corn trading in the mode of "basis pricing+option", and achieved good results. Based on the traditional hedging theory, the basis hedging strategy theory, the basis trade theory, the futures price discovery theory, this paper uses the case study method to illustrate three related questions: How “basis pricing+option” mode helps Haid Group avoid price risk, and how this mechanism works; Advantages of the mode in risk avoidance for feed enterprises; And an analysis of the risks and defects of the mode. The research finds that the feed enterprises could avoid price risk through the "basis pricing+option" mode by locking the basis in advance to reduce the absolute risk --- calculating the option strike price according to the futures prices on the basis agreement date, setting the highest transaction price --- confirming whether to exercise the option given according to the futures price on the final pricing date. Compared with traditional hedging, the advantage of the basis point price+option model is that feed enterprises and grain traders form long-term cooperation, reduce the trade costs and shorten procurement circle of feed enterprises, and give feed enterprises the initiative and flexibility to choose the purchase price and time. However, the mode would not be perfect, and strict counterparty credit review is required to avoid exposure risk before the final pricing date.

Keywords: Basis pricing; options; corn trade; hedging; price discovery.

1. Introduction

1.1 Macro Background of Feed Industry

In 2020, the outbreak of COVID-19 in China has seriously impacted the stability of the supply chain, the main buyers of the corn market postponed their business, and the transportation of grain and feed was sluggish, so the circulation of corn was in trouble. With the alleviation of the epidemic situation of African swine fever in China, the market is optimistic about the feed demand in the second half of 2020; The implementation of the Chinese government's policy to ensure agricultural production has led to a rise in the demand for corn and feed, pushing the price of corn to a higher point, together with driving the gap between supply and demand for feed corn to become larger.

At the same time, the successive outbreaks of COVID-19 globally have further reduced the feasibility for feed enterprises to obtain imported corn.

The supply mismatched with the demand of corn, and the futures and spot prices of corn were facing huge appreciation pressure. For feed enterprises, most of the consumers are farmers, who are highly sensitive to the rise of feed prices. The rise of feed prices must be smaller than the rise of the cost of corn purchased by enterprises. Therefore, feed enterprises need to actively use financial derivatives to hedge the risk of rising prices of raw materials.

1.2 Recent Status of Basis Trade

In the world, basis pricing (graph illustration in Fig.1) has been promoted for nearly 20 years. It is the international mainstream commodity pricing mode, supported by mature theories such as basis trade theory, GS model, and basis hedging strategy theory. However, it is still in the exploration stage in China. Dalian and Zhengzhou Commodity Exchanges have only started to implement the mode in

transactions since 2014, and the mode is mostly seen in ore trading. The basis pricing trade of corn and the hedging strategy of feed enterprises are rarely studied [1].

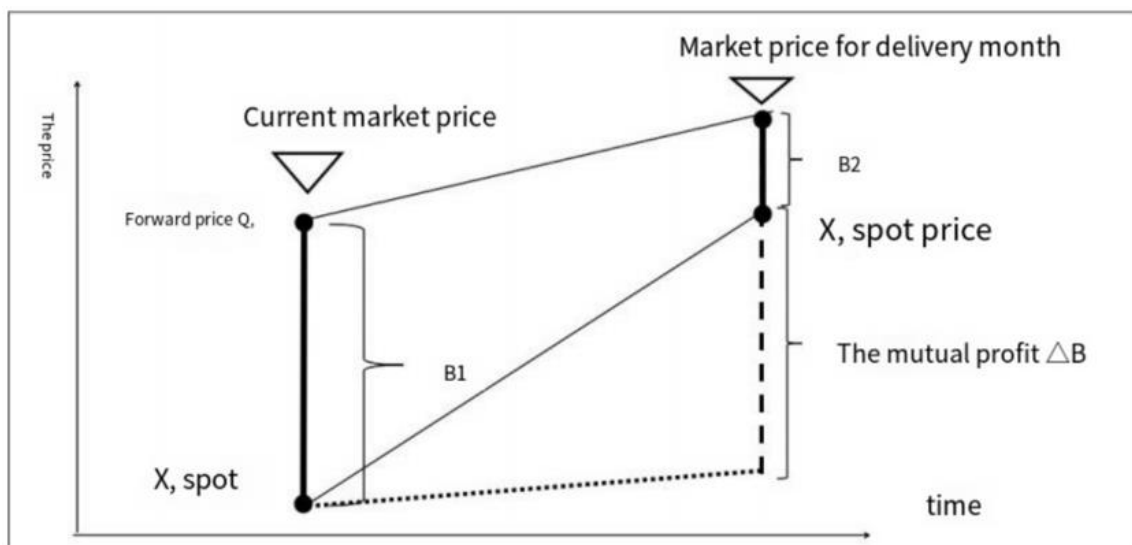


Fig 1. The illustration of basis trade.

At present, most researches focus on the hedging strategies of unilateral enterprises, mostly on zero sum games. The "basis pricing+option" mode is a win-win hedging strategy, which realizes mutual benefit between feed enterprises and grain traders, and is worth further analysis.

1.3 Problems in Traditional Hedging

The traditional hedging theory has problems. Although the trend of futures market price is similar to that of spot market, it is not exactly the same, so it is difficult to achieve perfect hedging, and hedging also requires costs. Traditional hedging (hedging ratio is 1:1) is often not ideal, so how to hedge, how to avoid risk as much as possible, or how to avoid risk on the premise of giving consideration to income, is the key to the problem [2].

1.4 Ideas and Research Issues of This Paper

To sum up, this paper analyzes the corn basis contract trade between Louis Dreyfus and the world's top ten feed enterprise Haid Group in 2020 through case study, and summarizes the mechanism of the "basis pricing+option" mode for feed enterprises to avoid the uncertainty of purchase price, reduce the purchase cost, and lock in profits in advance. It also illustrates the benefits of this mode for Chinese feed enterprises to stabilize production, improve profitability and integrate the industrial chain.

2. Case Study

2.1 Background

At the beginning of 2020, the domestic and international circulation of corn was impacted by the outbreak of the new COVID epidemic in China and other countries. At the same time, China's domestic policy for stabilizing feed production and the recovery from African swine fever have made the demand for corn feed increasingly strong.

All of the above trigger thinking and concern of China's feed processing enterprise, Haid Group, about the stable supply of food sources. In this context, the importance of Haid Group to lock forward supply of goods in advance has become increasingly prominent. Haid needs to determine the supply channel and purchase quantity in advance according to the long-term production plan. Since 2003,

Haid Group has actively been using futures trading to hedge procurement risks. In 2006, a hedging team was established to standardize the operation.

As a top feed enterprise, when the price of corn rises, a large number of purchases will significantly lift the price of the corn spot market, compressing the profit space of the enterprise and increasing the risk of inventory impairment. The futures market hedging funds required are also huge, which brings great financial pressure. Haid Group plans to purchase 30000 tons of corn in Jinzhou Port in April 2020.

At this time, as one of the four major international grain merchants, Louis Dreyfus Group is also actively seeking for opportunities for large-scale sales cooperation. Driven by the initiative of Dalian Commodity Exchange, Haid Group and Louis Dreyfus Group reaches a corn trading mode of "base price+option". Haid Group purchases corn from Louis Dreyfus in the form of basis trade, and both parties sign a basis contract. The contract does not determine the specific price, but takes "C2005 corn futures price+basis" as the transaction price of the trade between the two parties. Haid Group can select an appropriate time to appoint the price during the price counting period, and take this price as the final trade price. The contract also embeds options: during the price counting period, if the C2005 futures price is higher than 1960 RMB, Haid Group can lock the price at 1960 RMB as the final price to avoid the risk caused by the continuous rise of futures prices.

Finally, Louis Dreyfus hedges in the futures market while purchasing in cash market on February 4, and the basis on that day is -124RMB. In addition, on February 18, Louis Dreyfus purchases the corn call option in the Dalian commodity Exchange, providing Haid Group with the highest purchase price limitation.

On March 11, the two parties sign a basis contract, which stipulates that the delivery date will be within April. Theoretically, the spot basis of Jinzhou Port in April will be about 35 yuan. This basis contract includes the premium cost of some call options, so the basis determined by both parties is -20 RMB/ton, that is, the final contract price is "1960 RMB/ton+(-20 RMB/ton).

On April 7, 2020, Haid Group sends a letter to Louis Dreyfus. Haid Group exercises the order and completes the price counting. At that time, futures prices have risen slightly, while spot prices are rising significantly, and the corresponding basis goes stronger. Haid Group reduces the purchase cost from the spot price of 1970 RMB/ton at Jinzhou Port to the contract strike price of 1940 RMB/ton by using the mode, effectively cutting down the purchase cost of corn by 30 RMB/ton, saving the company about 900000 RMB.

2.2 Question Proposition

Based on the above background, the following questions are proposed:

How does the "basis pricing+option" mode help Haid Group avoid price risk, and how does the mode work?

Advantages of the "basis pricing+option" mode in risk avoidance of feed enterprises compared with traditional hedging operations.

Risks and defects of the "basis pricing+option" mode.

2.3 Analysis on the Problem

2.3.1 Question 1

According to the basis trade theory [3] (working 1960), It can be obtained that on February 4, 2020, Louis Dreyfus shorts 30000 tons of C2005 futures (price trend in Fig.2) in Dalian Commodity Exchange, and the price of C2005 futures was $F_1=1937$. On that day, the spot purchase price of Louis Dreyfus on February 4 is $S_1=1813$, and the basis on that day is $B_1=-124$. At that period, the whole country is in the post Spring Festival period. Under the impact of epidemic prevention and control, the spot demand for corn is small and still at a low level. The price of C2005 corn futures traded in May is much higher than the spot price in February. According to the price discovery theory of futures [4], the futures price reflects that there is a strong appreciation pressure in the spot market.

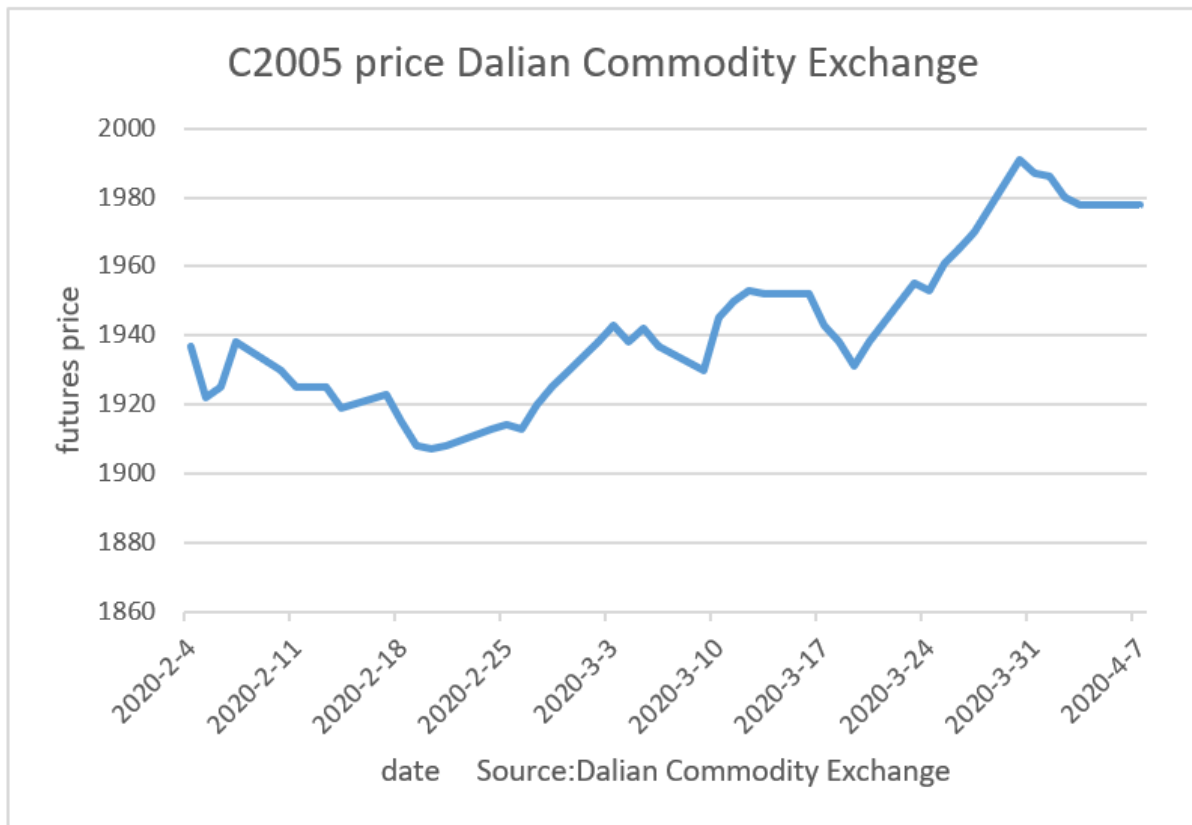


Fig 2. C2005 American corn futures prices trend.

On March 11, 2020, Louis Dreyfus and Haid Group sign a basis agreement, stipulating that the point price basis in April is - 20 yuan. At this time, the price of C2005 is 1950 yuan. According to the price discovery function of the corn futures market [5], it is expected that the futures price will be about 1960 when the option is exercised in April, slightly higher than the futures price in March. And the basis is much lower than that in February. According to the basis hedging strategy theory [6] (working 1960) and the traditional hedging theory [7], at this point, after the basis is determined, Haid Group has well transferred the absolute spot appreciation risk to the risk of basis, which is much smaller. From the perspective of futures price discovery theory [8] and traditional hedging theory [9], the closer to the maturity date, the closer the futures and spot prices are, and the smaller the basis is, following smaller the risk of fluctuation of the basis is. After the price ceiling is set at 1940 yuan, Haid Group basically locks in advance the relative purchase cost and the profit of the feed production in April.

On April 7, 2020, the C2005 price of Dalian Exchange was $F_2=1978$, the spot price of Jinzhou Port on that day is $S_2=1970$, and the basis is $B_2=- 8$. According to the agreement, the basis agreed by Haid Group and Louis Dreyfus is - 20 yuan. If the price of C2005 futures exceeds 1960 RMB on the pricing date in April, Haid Group is entitled to exercise at the price of $1960+ (-20)$ according to the option agreement. In this circumstance, the price of C2005 on April 7, $1978 > 1960$, is higher, so the final exercise price of Haid Group is determined to be 1940 RMB/ton, and the spot corn price of Jinzhou Port on April 7 is 1970 RMB/ton, saving 30 RMB per ton of purchase cost.

Futures have risen by 51 RMB from February 4 to April 7, while spot prices have risen by 157 yuan. The agreement basis forecast is rather accurate. It can be concluded that the price risk avoidance path of the “basis pricing+option” mode is: locking the basis in advance to reduce the absolute risk - calculating the option exercise price according to the futures price on the basis agreement date, setting the maximum transaction price - confirming whether to exercise according to the futures price on the basis agreement date.

2.3.2 Question 2

On February 18, Louis Dreyfus further purchases the corn call option to provide option services for subsequent signing of the basic agreement that is, setting the maximum purchase price. In the past, Haid Group had to carry out corresponding operations in the futures market according to the purchase volume in the spot market, and subsequently close out the position. According to the basis trade theory [10], a successful basis trade is a hedging operation agreed by both parties. As the basis buyer, Haid Group transfers the hedging risk to Louis Dreyfus Group, saving the futures operation cost and option operation cost of hedging.

Meanwhile, Louis Dreyfus Group closes the futures sales contract on March 11 and February 4. The price of C2005 on March 11 is 1950 and that on February 4 is 1937. It is expected that the yield per ton will decrease by 13 RMB. On the same day, Louis Dreyfus exercises its call option, and when Haid Group locks the maximum purchase cost at 1940 RMB/ton, Louis Dreyfus Group also locks the maximum net profit per ton at 59 RMB. The calculation is: 1940 (final highest transaction price) - 1813 (call price) - 13 (closing loss) - 55 (option premium) = 59 . Therefore, the use of the "basis pricing+option" mode cannot only help Haid Group lock in the maximum procurement cost and determine the profit space in advance, but also help Louis Dreyfus Group lock in the maximum profit per ton and achieve the goal of mass trading. Compared with the traditional hedging, the mode is a win-win situation.

Under the "basis price+option" mode, it is conducive to establish long-term cooperation between Haid Group and Louis Dreyfus Group, reducing the intermediate process of trade and transaction costs of both parties. Haid Group has reached the goal of stabilizing the supply chain and reducing procurement costs, and Louis Dreyfus Group has reached the goal of stabilizing customer groups [11].

The traditional hedging often produces imperfect results, because neither the amount nor the quality of futures contract matches the actual situation. The "basis pricing+option" mode has improved the initiative and flexibility of feed enterprises in purchasing. In cooperation with large grain traders, the choice of delivery varieties is more diversified. At the same time, the mode also fully combines the two fundamental functions of futures market: price discovery and risk avoidance [12]. Compared with traditional hedging strategy, the hedging effect of feed enterprises is more thorough, which is reflected in the degree of matching both in hedging quantity and in hedging commodity quality aspect.

2.3.3 Question 3

In basis pricing, due to the rights of the basis buyer and the seller are not equal, the seller sells the basis and has the right to quote in the basis transaction, while the buyer buys the basis and has the right to appoint the price in the basis. Feed enterprises, as buyers, generally do not conduct hedging operations in order to strive for more favorable prices when the appoint price, and the feed companies face the price exposure risk before appointing price. As corn futures price is rising, the exposure risk is rising at the same time. Therefore, as a basis buyer, it is also necessary to properly conduct corresponding options and futures operations to control the exposure risk in certain degree.

At the same time, the counterparty risk of the basis trade is also worthy of vigilance. In recent years, China has also witnessed the default of the basis seller in delaying or refusing to deliver. This requires the feed company as the basis buyer to conduct credit review in advance and select appropriate suppliers or futures companies for cooperation.

3. Result and Suggestions

3.1 Research Summary

Through case study, this paper finds that the path for feed enterprises to avoid price risk through the "basis pricing+option" mode is: locking the basis in advance to reduce the absolute risk - calculating the option exercise price according to the futures price on the basis agreement date, setting the highest transaction price - confirming whether to exercise or not based on the futures price on the

pricing date. Compared with traditional hedging, the advantage of the “basis pricing+option mode” is that feed enterprises and grain traders form long-term cooperation, which is mutually beneficial and win-win rather than zero sum game. The mode can reduce the trade costs and procurement process of feed enterprises, and give feed enterprises the initiative and flexibility to choose the purchase price and time.

The mode has been introduced in China, and this should be attributed to the development of market-oriented pricing of agricultural products and the continuous improvement of China's futures market. At the same time, the opening level of China's economy has continued to improve, which is an important background for international grain traders to cooperate with Chinese local enterprises.

3.2 Suggestions

Therefore, it is recommended that feed enterprises actively participate in the “basis pricing+option” mode to reduce procurement costs and avoid price risks

In the meantime, it is suggested that large grain traders lock in profits in advance and stabilize customer groups through the “base pricing+option model”.

It is suggested that China's commodity exchanges should further spread the “basis pricing+option” mode from ore and soybean deal to other commodity markets. Consequently, futures market will fully perform the role of price discovery and risk aversion, improving the ability of futures market to better serve economic and social demand.

4. Conclusion

This paper combines the traditional hedging theory, the basis hedging strategy theory, the basis trade theory and the futures price discovery theory to analyze the corn trade case between Haid Group and Louis Dreyfus Group. Under the historical background of China's all-round opening up in the new era, this paper puts forward new ideas on hedging; Together with China's advocating the new concept of win-win cooperation, the paper elaborates on the action path of risk avoidance between feed enterprises and grain traders, providing a certain research basis for subsequent researchers to promote the “basis pricing+option” model to other commodity trading scenarios.

Basis pricing is divided into two types: buyers and seller's bid. This study only analyzes the basis trade of buyer's bid from the perspective of feed enterprises, so the analysis is not comprehensive enough.

China's futures market has officially launched corn futures since 2004, and the development and perfection of futures and spot markets are lower than those of western countries, which to some extent restricts the development of basis trade. Suggestions based on this case may have limited external effectiveness.

The basis point price model also has risk exposure, which is smaller and more controllable than that of traditional hedging. The mode is not a perfect solution.

China attaches great importance to the issue of agriculture, rural areas and farmers. In the futures market, the trading of agricultural products accounts for a huge share. How to make the “basis pricing+option” mode better benefits enterprises in the agricultural field, we need to use new theories to explain the mechanism and put forward more specific suggestions from multiple perspectives.

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