

# Discovery Analysis of Chinese Soybean Meal Futures and Options Prices

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**Abstract:** The trading of soybean meal futures and soybean meal options (the first option in China) on the Dalian Commodity Exchange of China plays an important role in stabilizing the spot market of agricultural products and enhancing the independent price discovery function. This article uses 30 minute high-frequency price data of soybean meal futures and options from October 27, 2017 to October 27, 2018, and uses the VEC model, common factor model, and option parity theory to study the price discovery function of soybean meal futures and options. The results show that: (1) the cointegration coefficient of soybean meal futures and options is (1, -0.9796), indicating a high pricing efficiency; (2) Soybean meal futures have a strong and unidirectional guidance on options; (3) There are differences in the impact of soybean meal futures on options under different fluctuations, with asymmetric characteristics of stronger rising period than falling period; (4) The price discovery ratio of soybean meal futures is higher than that of options, which is the main force in the process of price discovery information transmission.

**Keywords:** Soybean meal; Futures; Options; VECM; Price discovery

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## Introduction

Commodity futures and options are modern financial market transactions that have received widespread attention from various sectors due to their role in avoiding price risks, price discovery, improving fund allocation and efficiency in the spot market. In 2003, at the Third Plenary Session of the 16th Central Committee of the Communist Party of China, it was recommended to “steadily develop the futures market”, and various commodity futures varieties were approved for listing, greatly enriching commodity futures products. The launch of soybean meal futures and options has enhanced the ability of the agricultural product market to discover market prices, accelerated the speed of market information transmission, and significantly reduced the impact of agricultural product market risks. They play an important role in the stable development of China’s commodity market and economy and finance. This article uses 30 minute high-frequency data to conduct empirical research on the information efficiency of important markets for soybean meal futures and options in China, and positions the newly launched soybean meal option market in China.

## 1. Literature review

Foreign scholars have discovered market efficiency in studying futures prices. Granger (1969) proposed that the predictive ability is tested by the causal relationship of variables, which includes information and order. Until Hasgroup (1995) established the IS model based on the VEC model, and Gonzalo and Granger (1995) established the PT model, both of which were used to qualitatively and quantitatively describe the price discovery market function. They are widely used in economics and are suitable for fields such as commodity futures and financial derivatives.

In the study of the impact of soybean meal futures and option prices in China, Mou Yating (2017) studied the role of information technology tool soybean meal options in reducing the cost of spot soybeans and soybean meal and increasing returns in the trading process. The results showed that soybean meal options can reduce the market and trading risks of soybeans and soybean meal, increase farmers’ income, and the application of information technology has accelerated the modernization of agriculture in China. Yu Xing (2018) studied the hedging function of soybean meal options, and the results showed that soybean meal options are difficult to hedge, and if used improperly, it is likely to cause losses to investors. Jiang Lunzheng (2018) studied the hedging strategy of soybean meal options and concluded that long call options should expand their price range to reduce hedging costs and increase profit oppor-

tunities, while short put options should reduce their price range to reduce risks and obtain stable returns. Xie Jiazhu (2018) studied the arbitrage opportunities of soybean meal options and found that the maximum return can be obtained when opening and closing positions on the day of establishment and exercise. The above research indicates that the introduction of soybean meal futures and options in China has indeed reduced market costs, improved market quality, and increased efficiency and efficiency. However, both markets clearly have their own advantages and disadvantages. As for the soybean meal option market, various options such as different targets, expiration dates, execution prices, and transaction costs increase the professionalism of hedging, hedging, arbitrage, and other strategic transactions.

On the basis of existing research, this article focuses on the important function of price discovery in soybean meal futures and options markets. In the new context, various empirical analysis methods are combined to conduct research, objectively and comprehensively reflecting the market efficiency of price discovery in China's soybean meal futures and options markets.

## 2. Empirical results

### 2.1 Variable selection and data sources

Soybean meal futures are one of the agricultural product futures varieties that have been listed on the Dalian Commodity Exchange (DCE) for a long time. Their trading volume and holdings are relatively active, playing a positive role in guiding prices and avoiding risks in the agricultural product industry. The price of soybean meal futures is selected as the main contract price with the highest trading volume. The selection of soybean meal option data removed the unstable data six months after the option was listed, and the option price was the strike price contract price with the highest trading volume. The time series data in this article is selected from the 30 minute closing prices of soybean meal futures and options from October 27, 2017 to October 27, 2018, with 4880 high-frequency data in each of the two time series. The data comes from WIND.

### 2.2 Based on VEC model verification results

The VEC (2) model was determined and established using information criteria such as AIC, and the equation passed the stability test.

(1) In the error correction coefficient, soybean meal options are significant while futures are not. The value of the soybean meal futures coefficient is -0.0043. When the previous period's soybean meal futures price is below the equilibrium price, i.e.  $ecmt-1 < 0$ , the current period's soybean meal futures price will rise under the influence of a negative coefficient; When the previous soybean meal futures price is above the equilibrium price, i.e.  $ecmt-1 > 0$ , the current soybean meal futures price will decline under the influence of a negative coefficient.

The estimated coefficient of soybean meal option is 0.0090, and the relationship between soybean meal futures and option prices is reverse. Due to the fact that the absolute value of options is greater than that of futures, in the long run, the speed of adjustment of futures closer to the equilibrium price is small and dominant.

In summary, from the perspective of the error correction coefficient adjustment price discovery mechanism, the share of soybean meal futures price discovery function is greater than that of options. In addition, combined with the 0.9796 cointegration coefficient, that is, when the soybean meal option changes by 1 unit, the soybean meal futures change by 0.9796 units. Therefore, the soybean meal option has a positive effect on the convergence and stability of futures prices.

(2) In terms of short-term changes, soybean meal options are significantly affected by the soybean meal futures market's first 1% and second 1% in the corresponding equation, indicating that the soybean meal futures price Granger guides the soybean meal option price for 60 minutes. Soybean meal futures are not significantly affected by options 1 and 2, indicating no guiding relationship.

In addition, the impact of a standard deviation shock from soybean meal option prices on futures prices reaches its maximum at the second unit, and still increases after adjustment; The impact of a standard deviation shock on the option price from soybean meal futures reached its maximum at the third unit, and continued to increase after a brief adjustment. Therefore, the soybean meal market has a stronger response to options from futures shocks, which may be due to various reasons such as asymmetric information in the options market and low market closeness.

(3) When the yield of soybean meal futures with a lag of 1 period rises rapidly ( $\tau > 0.95$ ) has the greatest impact on current options; The fluctuation of soybean meal futures in the previous period was relatively small ( $0.25 < \tau < 0.75$ ) has a relatively stable impact on current options, and the regression coefficient varies within the range of [0.018, 0.033]; When rapidly declining ( $\tau < 0.05$ ), and the quantile regression coefficient is relatively large. The regression coefficient of lag 1 has a significant U-shaped distribution characteristic. In addition, the impact of lagged 1-period futures on options is greater than that of lagged 2-period futures, and in extreme ups and downs, there is an asymmetry where the rising period is stronger than the falling period.

(4) PT and IS model results. Within the sample interval, the market share of soybean meal prices was found, with futures options having futures shares of 67.67% and 59.79%, respectively; The option value of soybean meal is 32.33% and 40.21%. The price changes of soybean meal futures respond more to new information, further confirming the important role of China's soybean meal futures market in information transmission and price discovery, as well as the differentiation of soybean meal futures and options markets in price discovery market functions.

### **3. Conclusion and suggestions**

#### **3.1 Conclusion.**

(1) The cointegration coefficient of soybean meal futures and options in China is (1, -0.9796), demonstrating high pricing efficiency; (2) Futures have greater guiding power over options; (3) There are differences in the impact of soybean meal futures on options under different fluctuations, with asymmetric characteristics; (4) The price discovery ratio of soybean meal futures market is higher than that of options market, which is the main force in the process of price discovery information transmission, and also indicates that the two still maintain a certain degree of close relationship.

#### **3.2 Suggestions**

(1) The futures market is also a barometer of the economy, and in the new market environment, China's opening up will bring new ideas to international cooperation. Through the modernization of the service industry to promote industrial transformation and upgrading, the conclusion of this article affirms the functions and roles of China's commodity futures market and option market. Developing China's futures and option market is a strong guarantee for China's financial market to serve the real economy, industrial development strategy, and national development strategy. (2) Improve the construction of laws and regulations, manage risks from the source of the financial derivatives market, prevent risks from being transmitted from the high-end to the low-end agricultural product spot market, and form a risk chain, and strengthen risk diversification control or risk management. (3) Improve the market system. From international experience, futures and options have different roles in risk management. The introduction of multiple commodity options can help long-term funds enter the futures market in a stable manner, improve the ecological environment of the financial market, and optimize the demand structure of investors.

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