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# *The Regional Spread of Wheat, Corn and Other Agricultural Products*

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***Abstract:*** Price stability has a bearing on the well-being of people and is one of the main goals of China's macroeconomic policy. As an important leading indicator of changes in the overall price level, excessive changes in the price of agricultural products will have an important impact on the overall price level, which will adversely affect people's production and life and affect the stable operation of the national economy. The difficulty of buying and selling agricultural products in China is becoming increasingly prominent, which seriously affects farmers' income and the stability of agricultural economic order. As an indispensable component of the price mechanism, agricultural product price transmission is of great significance for the timely discovery of the difficulty of buying and selling in the process of commodity transactions. Based on the above background, the research content of this article is the study of agricultural product regional price differences and regional price fluctuations. This article uses wheat as an example, with the help of modern economics theories and research methods, starting from the supply and demand relationship of the wheat market in China and external shock factors, to establish an analytical framework for the fluctuation and impact of wheat prices in China, by analyzing the causes and mechanisms of wheat price fluctuations, The mechanism, mode and degree of influence of the main influencing factors are clarified, and the transmission effect of wheat price fluctuations in China and the supply response behavior of wheat producers are analyzed on this basis. Finally, experimental simulations show that the correlation coefficient between Beijing and Shijiazhuang, Hefei and Nanjing is the largest, which is 0.991, and the correlation coefficient between Zhengzhou and Guangzhou is the smallest, which is 0.957. It can be seen that the distance between the markets has an effect on the correlation degree of wheat market prices. Larger.

## 1. Introduction

In today's society, due to the rising prices of agricultural products, the differences in logistics and

transportation, and the development of urban regionalization, the information dissemination of agricultural products is extremely asymmetric, and the difficulty of buying and selling commodities is becoming increasingly prominent. And it is also related to the stability of agricultural product market prices and the daily lives of residents, but also to the sustainable development of our country's agriculture, social order and economic order. Therefore, it is necessary to study the price transmission law of agricultural products. On the one hand, it is conducive to solving the problem of difficult to buy and sell, and to promote the automatic docking of supply and demand transactions.

Since the 1990s, major changes have taken place in China's grain production pattern. The imbalance of grain supply and demand in the region has become more prominent. The development of grain production in the south has been slow. In many provinces and municipalities, there has been insufficient supply and demand, and northern production has grown faster than demand. At the same time, the distribution of major grain varieties is uneven [1-2]. The general trend is that the supply of rice and corn is tightening in the south, and the supply of wheat and corn is excessive in the north [3]. With the changes in the layout of grain production and demand regions, China has formed a regional distribution pattern of "Northern Grain Transport to the South" and "COFCO Westward Progress" [4]. Changes in the pattern of grain production and consumption have placed higher requirements on the circulation of grain production, acquisition, storage, transportation, and processing, and have also increased the risk of market and price fluctuations [5-6]. The research object and content of foreign agricultural product price fluctuations focus on the formation process of agricultural product prices under market economy conditions [7]. From the relevant foreign literature, the research on the early producers' response to prices is mainly focused on whether farmers have a sensitivity to prices in traditional agriculture [8]. Most scholars have studied the price response of food supply based on rational assumptions of farmers' behaviors, but because farmers' production decisions are affected by a variety of factors and become extremely complicated [9], it is difficult to comprehensively describe all the factors affecting farmers' decisions and the specific process of decision-making [10-11] .

Yang introduced a stochastic financial price model of stock price and return simulation based on the contact process theory. The model is a random interaction system. Yang studied the correlation of the simulated income series from the proposed model and compared the simulation results with actual data including the Shanghai Stock Exchange Composite Index (SSE) and Shenzhen Stock Exchange Component Index (SZSE). In the cross-correlation analysis, the cross-correlation between different intensities and initial densities was analyzed and compared with the actual data of SSE and SZSE. They were found to be interrelated. In addition, in the autocorrelation analysis, a universal autocorrelation function, a q-order autocorrelation function, and a multi-autocorrelation function were used, respectively. Single-income sequences were studied from simulations and real financial markets. From these three results, it can be seen that both the simulated data and the actual data have volatility clustering [12]. From the perspective of corporate efficiency and the fluctuation of raw material prices as an important factor, Zhang used the stochastic frontier analysis method to study the technical efficiency and trends of China's listed rare earth permanent magnet companies from 2006 to 2011.Zhang's research results are as follows: First, the rare earth permanent magnet industry is in a period of scale benefit growth, but there is no scale effect. Secondly, pressure from the capital market, the shareholding of the largest shareholder, the earnings per share, and the state-owned nature of the major shareholders can significantly improve the technical efficiency of the rare earth permanent magnet industry. Third, the fluctuation of raw material prices reflects the demand for downstream products in the industry. Zhang's research results show that rising raw material prices can increase the efficiency of the industry. Increasing the demand for downstream products will help improve the technical efficiency of the rare earth permanent magnet industry

[13].

From a research perspective, most of the current studies on food price fluctuations are mainly analyzed from one or more aspects that affect food prices. In the study, this article puts wheat price fluctuations within the framework of equilibrium analysis, and uses the theory of supply and demand and market equilibrium to analyze the influencing factors and mechanism of wheat price fluctuations from the perspective of internal transmission and external shocks. There are many literatures on grain market integration and market price transmission in different regions, but from the perspective of wheat production and sales regions, there is still a lack of literature on the role of markets in different regions in the transmission of price fluctuations.

## 2. Proposed Method

### 2.1 Agricultural Product Prices

Agricultural products are a collective term for all types of agricultural primary products. In a broad sense, agricultural products refer to primary products produced by the agricultural sector. The agricultural primary products stipulated by the state include planting, animal husbandry, and fishery products, but they do not include processed products. Specifically, including grain, oil crops, meat and poultry and their products (including pork, beef, mutton, poultry, etc.), eggs, aquatic products, dried fruits and vegetables, milk, sugar cane, cotton, tobacco and other agricultural, Products produced by forestry, animal husbandry, vice, fishery. The concept of agricultural products used in this article is broad. However, the agricultural products that are specifically analyzed are mainly agricultural products that have a large rigid demand and are closely related to our daily life.

Agricultural product prices are not born. Only when agricultural products circulate on the market in the form of commodities and are traded according to a certain amount of currency, then agricultural products have prices. The price of agricultural products is the currency manifestation when agricultural products are circulated on the market as commodities. According to the form of price management, agricultural product prices can be divided into national unified pricing, state-guided pricing, and market pricing. The classification of this pricing method is mainly related to China's agricultural policies. According to the different circulation links of agricultural products in the market, we divide agricultural product prices into agricultural product purchase prices, agricultural product wholesale prices, agricultural product allocation prices, and agricultural product retail prices.

The purchase price of agricultural products is the price of purchasing agricultural products from farmers, and is the first price for agricultural products to enter the field of commodity circulation. The purchase price of agricultural products determines the income of farmers, and is also the basis for other prices of agricultural products in the field of circulation. In addition, agricultural products as the means of production or production costs of other agricultural processed products and non-agricultural industries, affect the prices of other products and workers' income. The wholesale price of agricultural products refers to the price formed by agricultural products in the wholesale market. Wholesale markets provide bulk trading of agricultural products, with agricultural product distribution functions, relatively complete trading facilities and better trading services. Therefore, the agricultural product wholesale market is an organized, disciplined, relatively clear place for trading time, place, and trading rules. In this market, different agricultural products compete on the same field, and even the same agricultural product can be valued according to quality, which can relatively truly reflect the value of agricultural products and the relationship between market supply and demand. The agricultural product transfer price refers to the price formed by the buyer and seller under certain constraints, mainly the settlement price of the agricultural product transfer within the socialist business system. The transfer price generally consists of the purchase price,

circulation costs and profits, and is the sum of profit, circulation costs and purchase prices. The price of agricultural products has arisen in order to meet the needs of the transformation of capitalist commodities into socialism, so that state-owned businesses can enjoy the spread of allocation and are in a favorable position in the competition.

## 2.2 Fluctuation of Agricultural Product Prices

Generally speaking, there are two reasons that cause economic fluctuations: one is the transmission of internal structure; the other is that external shocks cause economic fluctuations. From this analysis, the price fluctuation mechanism of wheat in China also comes from two aspects: one is the internal transmission mechanism, and the other is the external factor shock and its impact. Generally speaking, the internal conduction mechanism determines the continuity of the wave, and the external shock mechanism mainly affects the amplitude and wavelength of each wave cycle through the internal conduction mechanism, and determines the turning point in the wave process at some times. The price fluctuation is the result of the contradiction between the supply and demand of commodities, and the change in the relationship between supply and demand is still a decisive factor in the long-term trend of wheat market prices. At the same time, for China's wheat market, price fluctuations have their own special causes. Two of these factors dominate, one is its large number of small-scale producers, and scattered decision-making leads to unplanned changes in supply; the other is its lack of demand for flexibility. The inelasticity of demand makes the price response to supply changes violent, forming a divergent spider web model, which expands the impact.

From the actual situation, there are many internal and external factors affecting the price fluctuations of wheat market, including factors such as supply, demand and external environment. Wheat supply level factors include wheat production input, trade status, processing conditions, product circulation, producer expectations, national reserve system, etc .; demand level factors include income of residents, consumption habits, market prices of related products, consumer market expectations, etc. These two major factors constitute the main factors for wheat price fluctuations. In addition, the macroeconomic situation, the degree of market development, and national policies (especially circulation and price policies) are also important factors affecting the price fluctuations of the wheat market. The current general production mode of peasant households in China is small-scale, low level of organization, there is no perfect industrial system, and the ability to resist natural and market risks is weak. In recent years, the rise in the price of production materials has exacerbated farmers' planting risks. Under the condition of uneven risk and benefits, it is difficult for farmers to have accurate market foresight and maintain the stability of production, which has become an important source of wheat price fluctuations; At the same time, the imbalance in the production and sales of wheat in China has intensified, the risk monitoring and protection system in the wheat market is not complete, and the market development of the processing and distribution system is not high.It has also become a factor affecting the price fluctuations of wheat in China; meanwhile, population growth, living standards, and consumption structure The changes caused by the impact of changes in wheat demand will have varying degrees of impact on market prices.

The price is determined in the process of commodity production and exchange, so the price formation can be decomposed into two links of commodity production and market supply and demand, and the movement of these two links is affected by the movement of a series of specific factors. However, the factors that affect commodity prices are very different due to different systems and systems. In addition to the general commodity production and market supply and demand laws, China's wheat is also affected by China's system, policies and other factors.

Specifically, China's wheat price system is relatively complex and includes a variety of price patterns, which can be divided into government prices and markets. Price, which makes the factors that affect the price of wheat in our country not exactly equal to the general price theory.

### 2.3 Regional Spreads of Agricultural Products and Price Fluctuations between Regions

Before carrying out Granger causality test of long-term stable equilibrium relationship measurement based on price time series data, conducting cycle and path judgment, we must first determine whether the price data is stable. If a regression model is established directly based on non-stationary price data, the phenomenon of "false regression" is prone to occur, resulting in erroneous analysis. In this paper, the ADF unit root test method commonly used in econometrics is used to determine the stability of price data.

The ADF test is based on the DF (Dickey-Fuller) unit root test. It is no longer required to satisfy both the assumption that the time series is a first-order autoregressive process (and the random disturbance term is a white noise process. The ADF test assumes sequence data (referred to in the text Price data) is an AR stochastic process of order P. If the eigenvalues of the characteristic equations of the AR (p) model are all less than 1, then the price data is stable. The ADF test regression equation has the following three forms.

(1) No intercept term and no trend term

$$y_t = \phi_1 y_{t-1} + \phi_2 y_{t-2} + \ldots + \phi_p y_{t-p} + \varepsilon_t \tag{1}$$

$$y_t = p y_{t-1} + \varsigma_1 y_{t-1} + \varsigma_2 y_{t-2} \ldots + \varsigma_{p-1} y_{t-p-1} + \varepsilon_t \tag{2}$$

$$y_t = p y_{t-1} + \sum_{i=1}^{p-1} \varsigma_i \Delta y_{t-i} + \varepsilon_t \tag{3}$$

(2) Intercept term and no trend term

$$y_t = \mu + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \ldots + \phi_p y_{t-p} + \varepsilon_t \tag{4}$$

$$y_t = \mu + p y_{t-1} + \varsigma_1 y_{t-1} + \varsigma_2 y_{t-2} \ldots + \varsigma_{p-1} y_{t-p-1} + \varepsilon_t \tag{5}$$

$$y_t = \mu + p y_{t-1} + \sum_{i=1}^{p-1} \varsigma_i \Delta y_{t-i} + \varepsilon_t \tag{6}$$

(3) Intercept term and trend term

$$y_t = \mu + \beta t + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \ldots + \phi_p y_{t-p} + \varepsilon_t \tag{7}$$

$$y_t = \mu + \beta t + p y_{t-1} + \varsigma_1 y_{t-1} + \varsigma_2 y_{t-2} \ldots + \varsigma_{p-1} y_{t-p-1} + \varepsilon_t \tag{8}$$

$$y_t = \mu + \beta t + p y_{t-1} + \sum_{i=1}^{p-1} \varsigma_i \Delta y_{t-i} + \varepsilon_t \tag{9}$$

In the three test equations, $\phi_1, \phi_2, \ldots, \phi_p, \varsigma_1$ is a parameter term, μ is an intercept term, β is a trend term coefficient, and $\varepsilon_t \sim N(0, \sigma^2)$ is a white noise sequence. The ADF test assumes "H0: ρ = l", that is, the price data Y, is not stationary. There are two types of spatial weight matrices: spatial

proximity weight matrix and spatial distance weight matrix. The spatial proximity weight matrix can be divided into first-order proximity matrix and second-order proximity matrix. The first-order proximity matrix is based on the assumption that two regions have a common boundary. Spatial correlation will occur. Generally, there are two calculation methods: Rook proximity and Queen proximity. In theory, the distance weight matrix is more scientific than the adjacent weight matrix in spatial analysis, but the actual statistical data based on distance is difficult to obtain, so it is generally not used in practical analysis.

The Moran'SI index reflects the global spatial autocorrelation of the overall price level and cannot explain the autocorrelation in the local space. Therefore, in order to study the local spatial autocorrelation, a Moran scatter plot is used here to identify whether there is a difference in the form of spatial agglomeration of prices in different regions. Plotted in a Cartesian coordinate system, the abscissa corresponds to the standardized value Zi of the price level of area i, and the vertical axis corresponds to the weighted average ΣWijZj of all provincial prices adjacent to i. It is divided into four quadrants, the first quadrant and the third quadrant represent a positive spatial correlation, and the second quadrant and the fourth quadrant represent a negative spatial correlation. If the province falls in the first quadrant, it indicates that the price in the region is high, and the prices in its neighboring regions are also high, that is, the "high one high" combination; if it falls in the second quadrant, it indicates that the price in the region is low, and The price in the neighboring area is high, that is, the "low.high" combination; if it is in the third quadrant, it means that the price in the area is low, and the price in the neighboring area is also low, that is, the "low.low" combination; if it is in the fourth The quadrant indicates that the price in the area is high, and the price in the adjacent area is low, that is, the combination of "high-low".

## 3. Experiments

### 3.1 Experiment Design and Parameter Settings

The monthly or quarterly time series contains four types of change factors, namely: factors that affect long-term trends (T), cyclical factors (c), seasonally changing factors (s), and irregular factors (I). Seasonal changes and irregular factors often mask other objective changes in their price fluctuations, which will interfere with the analysis of the current price status.Therefore, generally remove the seasonal changes and irregular factors before analysis, and then Use trend decomposition to separate trends and cyclic elements. Among the trend decomposition methods, regression analysis, moving average method, HP filtering method, and BP filtering method are used for trend decomposition. In this research, HP (Hodrick.Prescott) filtering method is mainly used for trend decomposition. The HP filtering method is a smooth sequence trend obtained by Hodrick and Prescott (1980) using the principle of symmetric data moving average method. When the time series is analyzed with annual data, according to experience, the value of λ is 100; when the time series is analyzed with quarterly data, the value of λ can be 1600; when the time series is monthly data, the value of λ can be 14400.

### 3.2 Subjects and Data

This article analyzes the price fluctuations of agricultural products, using statistical analysis software evieWS7.2.The price time series of pork, beef, and mutton starts from January 2004 to December 2019, using the national monthly wholesale market prices, vegetable prices and fruits. The time series of prices starts in January 2004 and ends in December 2019, using the national monthly wholesale market prices. The calculation of the wave period is performed according to the time of the previous peak and the next peak. The agricultural product price index, agricultural

product price index, agricultural technological progress, and international food price index were all based on the 2004 base period, and the actual disposable income of urban households was indexed on the base period of 2002. All basic data comes from the statistical yearbooks of various provinces and cities over the years, the China Statistical Yearbook (calendar years), the China Agricultural Product Price Survey Yearbook of related years, and relevant FAO websites.

Due to the serious lack of data in Tianjin, Chongqing, Tibet, and Shanghai, after excluding these provinces, the sample finally includes panel data of 27 provinces and municipalities in mainland China from 2004 to 2019. For regional comparison, the sample provinces are further divided into three regions: east, central, and west.The eastern region includes 9 provinces and municipalities in Liaoning, Beijing, Hebei, Shandong, Zhejiang, Jiangsu, Fujian, Guangdong, and Hainan, and the central region includes Heilongjiang, Jilin, Shanxi, Henan, Anhui, Hubei, Hunan, and Jiangxi are eight provinces and municipalities. The western region includes Inner Mongolia, Gansu, Xinjiang, Qinghai, Ningxia, Sichuan, Shaanxi, Guizhou, Yunnan, and Guangxi.

## 4. Discussion

### 4.1 Correlation Analysis and Cointegration Test

Correlation coefficients can be used to test the correlation between prices of major wheat production and marketing areas. The correlation coefficient reflects the closeness of the relationship between market prices. The higher the correlation coefficient, the closer the relationship between prices. The correlation between the wheat spot markets in the six cities is shown in Table 1.

*Table 1. Correlation between wheat spot markets in six cities*

| | Bei Jing | He Fei | Nan Jing | Shi Jiazhuang | Zheng Zhou | Guang Zhou |
|---|---|---|---|---|---|---|
| Bei Jing | 1 | 0.978 | 0.982 | 0.991 | 0.973 | 0.962 |
| He Fei | 0.978 | 1 | 0.993 | 0.977 | 0.982 | 0.964 |
| Nan Jing | 0.982 | 0.993 | 1 | 0.982 | 0.983 | 0.964 |
| Shi Jiazhuang | 0.991 | 0.977 | 0.982 | 1 | 0.978 | 0.971 |
| Zheng Zhou | 0.973 | 0.982 | 0.983 | 0.978 | 1 | 0.957 |
| Guang Zhou | 0.962 | 0.964 | 0.964 | 0.971 | 0.957 | 1 |

Combined with the data in Table 1, the correlation analysis between the wheat spot markets is shown in Figure 1.

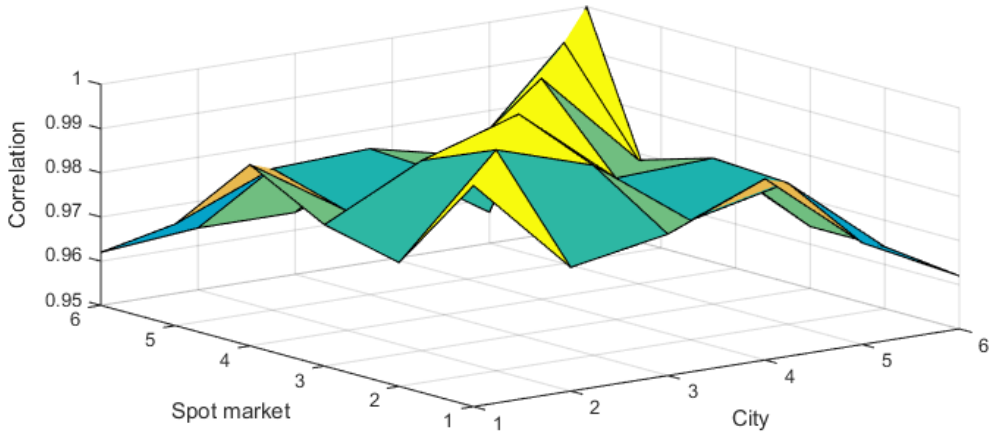

*Figure 1. Correlation analysis between wheat spot markets*

Looking at the correlation between the wheat spot markets in eight cities, the correlation coefficient between Beijing and Shijiazhuang, Hefei and Nanjing is the largest, which is 0.991, and the correlation coefficient between Zhengzhou and Guangzhou is the smallest, which is 0.957. The correlation coefficient of provinces is generally higher than that of distant provinces. It can be seen that the distance between markets has a greater impact on the correlation degree of wheat market prices. The correlation between market prices in various regions is relatively high, indicating that co-integration may exist. However, the correlation coefficient method used to analyze the price relationship between the main production and sales areas may have pseudo-correlation. Therefore, it is necessary to further use the co-integration and error correction test methods to analyze the relationship between the prices of the main production and sales areas of wheat. By comparing the ADF test statistic value of each series with the corresponding critical value, it can be found that the original series of wheat market prices in the selected eight regions are non-stationary series, and the first-order differences are rejected at the significance level of 1%. The unit root assumption, that is, the market price of wheat in China's main production and sales areas is a first-order stable sequence, which meets the premise of cointegration testing.

## 4.2 Analysis of Error Correction Model

There is a long-term equilibrium relationship in China's wheat market, so we can use the wheat price series of each paired market to establish an error correction model (VEC) model to test whether there is a short-term integration relationship between the markets with long-term integration relationships. The estimated results of the error correction model are shown in Table 2. As shown.

*Table 2. Error correction model estimation results*

| | Bei Jing | He Fei | Nan Jing | Shi Jiazhuang | Zheng Zhou | Guang Zhou |
|---|---|---|---|---|---|---|
| Bei Jing | | -0.371(8) | -0.442(14) | -0.553(4) | -0.454(5) | -0.611(4) |
| He Fei | -0.642(8) | | -0.574(4) | -0.542(5) | -0.614(10) | -1.001(8) |
| Nan Jing | -0.836(14) | -0.523(4) | | -0.502(5) | -0.772(4) | -0.871(9) |
| Shi Jiazhuang | -0.700(4) | -0.558(5) | -0.515(5) | | -0.756(5) | -1.230(11) |
| Zheng Zhou | -0.674(5) | -0.997(11) | -1.067(4) | -0.518(5) | | -0.997(11) |
| Guang Zhou | -0.515(4) | -0.359(8) | -0.476(9) | -0.176(11) | -0.370(11) | |

An analysis of the estimation results of the error correction model can be obtained according to the data in Table 2, as shown in Figure 2.

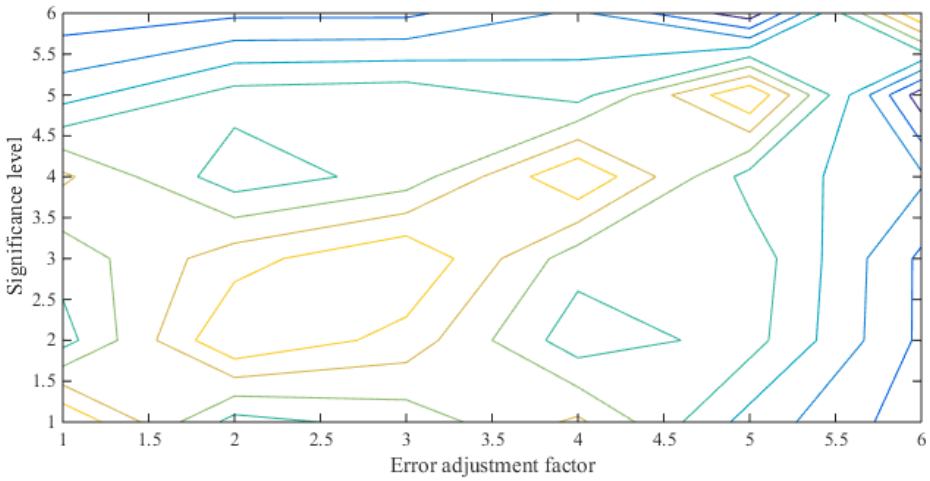


*Figure 2. Analysis of Error Correction Model Estimation Results*

From the perspective of the Beijing and Guangzhou wheat markets, the two markets also have better error correction mechanisms. The error adjustment coefficients of the two markets are .0.611 and .0.515, respectively. When they deviate from the long-term equilibrium, the speed of adjustment to the equilibrium relationship is faster. And the Beijing market is faster than the Guangzhou market. From the perspective of the Beijing and Hefei wheat markets, the error adjustment coefficients of the two are .0.370 and .0.642, both of which have error correction mechanisms, and the adjustment rate of the Hefei wheat market is faster than the adjustment rate of the Beijing market. From the perspective of the Beijing and Nanjing wheat markets, the error adjustment coefficients of the two are significantly non-zero at the 1% level and have error correction mechanisms. The error adjustment coefficients of the two are .0.442 and .0.836, respectively, indicating that the price adjustment speed of the Nanjing wheat market is far Hurry up with the Beijing market.From the perspective of the Beijing and Shijiazhuang wheat markets, they also have error correction mechanisms. The error adjustment coefficients of the two are 0.553 and 0.700 respectively. The adjustment speed of the Shijiazhuang wheat market is faster than that of the Beijing market. From the perspective of Beijing and Zhengzhou wheat markets, the two have error correction mechanisms, and the error adjustment coefficients of the two are 0.454 and. 0.674, Zhengzhou wheat market adjusted faster than Beijing market. Based on the above analysis, the above-mentioned markets with long-term integration relationships also have short-term integration relationships. This shows that the main wheat production and sales prices in China are also efficient in terms of short-term transmission. Judging from the ability of the short-term prices of the main production and sales areas to deviate from the long-term equilibrium price, compared with the market of the main sales area, the market in China's main wheat production areas has obvious error correction capabilities. When the price deviates from the long-term equilibrium price, it adjusts to an equilibrium state. The speed is faster than the wheat market in the main sales area, which reflects the stability of the price in the main production area and the volatility of the price in the main sales area. The wheat market in China is adapted to the market in the main sales area.

## 4.3 Granger Causality Test Analysis

Correlation analysis, cointegration test and error correction model test illustrate the stable relationship between wheat markets in various regions of China, and the speed of readjustment to the original equilibrium relationship after deviating from the equilibrium state. Granger causality test results analysis is shown in Figure 3.

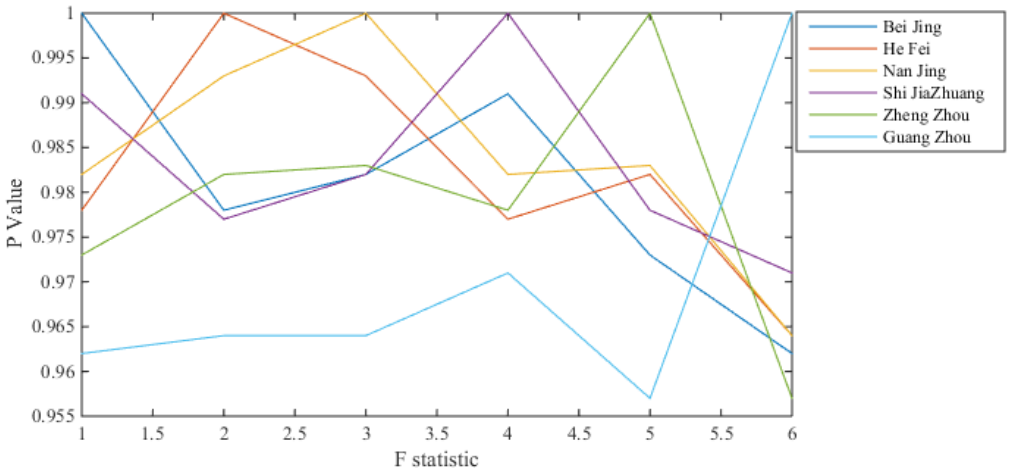


*Figure 3. Granger causality test results analysis*

Because the status and role of each market in the overall market are different, changes in different markets in the overall market will bring different impacts. The Granger causality test is used to explore the relationship between the guidance and the guidance of different markets, to explain the sequence of price changes between different markets, to objectively reflect the dominant market, and to better grasp the market operation law and price transmission direction. Physically, the mutual guidance of market prices in various regions is relatively obvious. From the perspective of regional transmission of wheat market prices, the production market has a significant role in guiding the market in the sales area, and the market has a weak role in guiding the market in the production area. The price-guiding relationship is relatively obvious; the market price-guiding relationship between production areas is not obvious.

## 4.4 Analysis of Dynamic Response Mechanism

The impulse response function of the agricultural product price fluctuation constructed by the SVAR model is shown in Figure 4.

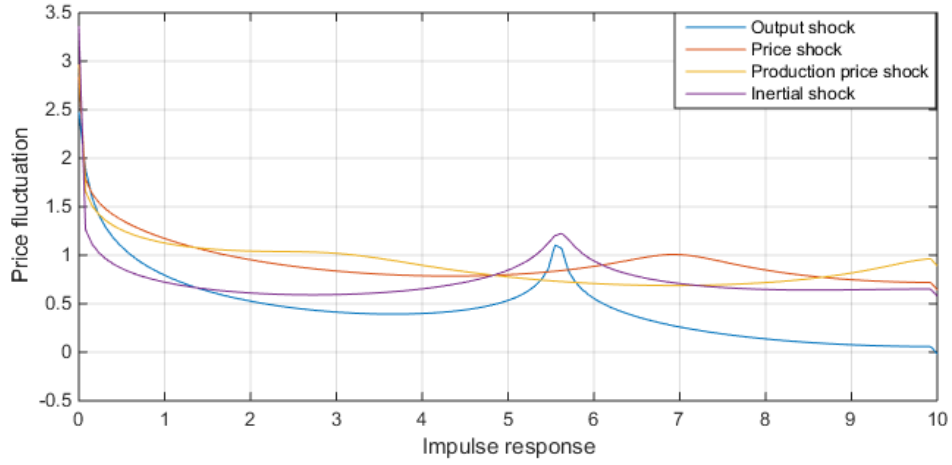


*Figure 4. Impulse Response Function of Agricultural Product Price Fluctuation in SVAR Model*

Get the impact of a standard deviation here. According to the above estimation results, we can find that there is a negative correlation between the fluctuation of agricultural output and the

fluctuation of agricultural prices. In the short term, the fluctuation of agricultural product output has a greater impact on agricultural product price fluctuations in the current period and the lagging period, and then gradually decreases to zero. In the long run, the elasticity of the retail price of agricultural products to the fluctuation of agricultural output is -0.21, that is, for each percentage point of output increase, the retail price of agricultural products decreases by 0.21. It can be seen that the impact of output fluctuations on agricultural product price fluctuations is small. In the long run, the effect of the price of agricultural products on the retail price of agricultural products is 0.085, which is approximately zero. In the short term, the prices of agricultural production materials still have a positive effect on the retail prices of agricultural products in the current period and the lagging period, and this effect is negative from the lagging period. This positive and negative effect offsets the overall impact of agricultural product prices on agricultural retail prices. In general, the fluctuation of agricultural product output has little effect on the retail price of agricultural products. It is not significant to regulate agricultural product price fluctuations by regulating agricultural product output.

## 5. Conclusions

This article takes wheat as an example, with the help of modern economics theories and research methods, based on China's wheat market supply and demand relationship, market development degree, macroeconomic environment and institutional policy factors, to establish an analysis framework of wheat price fluctuations and impact in China. Analysis of the causes and mechanisms of price fluctuations, the clarification of the main influencing factors, the mode of influence and the mechanism of their effects, and on this basis, the mechanism of price fluctuations and production fluctuations is analyzed.

Wheat price fluctuations are the result of a combination of factors. Various factors are intertwined and work together to make the fluctuation of wheat prices in China extremely complicated. Supply and demand relationship and external shocks will cause the supply and demand balance of the wheat market to change, so that the market price is always volatile. The main factor for the price fluctuation of the wheat market in China comes from the supply side, of which rising production costs have become the main driving force for the price increase of the wheat market.

There are some shortcomings in this paper. This paper chooses Granger causality test and other methods to conduct two experiments and obtain corresponding research results. However, the research on agricultural product price mechanism is still in its preliminary stage, and there is still content that needs to be improved and further explored. In addition, the study of price space conduction in this paper focuses on the conduction path and conduction cycle, and what factors have caused a price fluctuation has not been reasonably explained, so the next research can start from the factors that cause price changes.

## References

*[1] Kopittke P M , Dalal R C , Finn D .(2017). "Global Changes in Soil Stocks of Carbon, Nitrogen, Phosphorus, and Sulphur as Influenced by Long‐term Agricultural Production", Global Change Biology, 23(6),pp.2509-2519. https://doi.org/10.1111/gcb.13513*

*[2] Papadopoulou M P , Charchousi D , Tsoukala V K .(2016). "Water Footprint Assessment Considering Climate Change Effects on Future Agricultural Production in Mediterranean Region", Desalination & Water Treatment, 57(5), pp.2232-2242. https://doi.org/10.1080/19443994.2015.1049408*

*[3] Katarzyna Smędzik-Ambroży, Majchrzak A .(2017). "EU Agricultural Policy and Productivity*

*of Soil in Countries Varying in Terms of Intensity of Agricultural Production", Nephron Clinical Practice, 21(1), pp.250-258. https://doi.org/10.1515/manment-2015-0092*

*[4] Izmailov A Y .(2019). "Intelligent Technologies and Robotic Means in Agricultural Production", Herald of the Russian Academy of Sciences, 89(2), pp.209-210. https://doi.org/10.1134/S1019331619020072*

*[5] Wei Y , Wang X , Wang R .(2018). "Design and Implementation of Agricultural Production Management Information System Based on Web GIS", Nongye Gongcheng Xuebao/transactions of the Chinese Society of Agricultural Engineering, 34(16), pp.139-147.*

*[6] Mohammad Ali Tofigh , Zhendong Mu, Intelligent Web Information Extraction Model for Agricultural Product Quality and Safety System, Journal of Intelligent Systems and Internet of Things, 2021, Vol. 4, No. 2, pp: 99-110 (Doi: https://doi.org/10.54216/JISIoT.040203)*

*[7] Bellamy A S , Svensson O , Brink P J V D .(2018). "Insect Community Composition and Functional Roles Along a Tropical Agricultural Production Gradient", Environmental Science and Pollution Research, 25(14), pp.13426-13438. https://doi.org/10.1007/s11356-018-1818-4*

*[8] Oliveira P A D , Rodrigues S A , Padovani C R .(2017). "Association between Agricultural Production Value and the Use of Rural Area within the Municipalities in the State of São Paulo, Brazil", Journal of Agricultural ence and Technology B, 7(3),pp.147-157. https://doi.org/10.17265/2161-6264/2017.03.002*

*[9] Tavera Romero CA, Castro DF, Ortiz JH, Khalaf OI, Vargas MA. Synergy between Circular Economy and Industry 4.0: A Literature Review. Sustainability. 2021; 13(8):4331. https://doi.org/10.3390/su13084331 https://doi.org/10.3390/su13084331*

*[10] Szpyrka E , Magdalena Słowik-Borowiec, Matyaszek A .(2016). "Pesticide Residues in Raw Agricultural Products from the South-eastern Region of Poland and the Acute Risk Assessment", Roczniki Państwowego Zakładu Higieny, 67(3),pp.237-245.*

*[11] Houbing Song, Ravi Srinivasan, Tamim Sookoor, Sabina Jeschke, Smart Cities: Foundations, Principles and Applications. ISBN: 978-1-119-22639-0, Hoboken, NJ: Wiley, 2017, pp.1-906.*

*[12] Yang G , Wang D , Wang J .(2017). "Correlation Analysis of Price Fluctuation of Stock Market by Stochastic Interacting System", Beijing Jiaotong Daxue Xuebao/Journal of Beijing Jiaotong University, 41(3), pp.120-126. https://doi.org/10.17775/CSEEJPES.2017.0018*

*[13] Zhang J P , Bian L , Zhang P .(2016). "An Empirical Study of Effect of Raw Material Price Fluctuation of China's Listed Rare Earth Permanent Magnet Companies Based on Stochastic Frontier Analysis", Chinese Rare Earths, 37(1),pp.151-158.*