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Research on the Factors Affecting Soybean Futures Price in China

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Abstract

With the optimization of China's futures market system, our country has a more sound futures trading system. Soybean futures are an important variety of agricultural futures. The fluctuations in the soybean futures market will have a strong impact on operators, investors, and farmers. Therefore, analyzing its influencing factors is of great significance for predicting the fluctuations of soybean futures prices.

Against the backdrop of the increasingly sound system of China's futures market, soybeans, as a core agricultural futures product, have significant impacts on all parties in the industrial chain due to their price fluctuations. To accurately predict price trends, this study integrates theoretical and literature-based approaches, selecting key variables such as the US dollar exchange rate, market supply and demand, and the closing price of the soybean oil index. Through principal component analysis, three principal factors were extracted from 13 initial factors, and a regression model was constructed between these factors and soybean futures prices. The empirical results show that the rise in the closing prices of soybean oil and soybean meal indices is a significant driving force behind the increase in soybean futures prices. Based on this, the study provides specific recommendations for price prediction and risk management in soybean futures.

Keywords

Soybean, Futures price, Futures market

1. Introduction

As one of the world's most crucial bulk agricultural commodities, soybeans and their derivatives are not only vital to national food security but also deeply embedded in the global agricultural trade and financial systems. With China's futures market continuously optimizing its trading mechanisms and advancing internationalization, the core functions of price discovery and risk hedging have become increasingly prominent. As a cornerstone product in China's agricultural futures market, soybean futures prices directly influence the entire supply chain, profoundly impacting the operational decisions and financial outcomes of crushing enterprises, traders, growers, and investors. Therefore, thoroughly investigating the intrinsic formation mechanisms and key drivers of China's soybean futures prices not only enables market participants to make scientific predictions and effective risk management but also provides policymakers with solid theoretical foundations and decision-making references for maintaining market stability and ensuring industrial security, carrying significant theoretical and practical implications.

2. Literature Review

2.1 Domestic Literature

Regarding the prediction of soybean futures prices, the following scholars have conducted analyses: Yin Lan (2015) in China used principal component analysis, Zhou Dapeng; Mu Yueying (2022) selected the VAR model, Chen Fanghao (2016) focused on the specific impact of different market participants on soybean futures price fluctuations, Li Xinyue (2022) based on range sequences containing more volatility information, Liu Jinyuan (2019) proposed an improved prediction method based on the LSTM (Long Short-Term Memory) model to address the temporal, nonlinear, and non-stationary characteristics of agricultural futures prices, Teng Yongping; Zhou Tingting (2016) applied ARMA to predict soybean futures prices, Guo Qianqian; Wang Xinghui; Zhang Congqiao (2022) proposed a multi-frequency optimized combination model based on completely adaptive noise ensemble empirical mode decomposition (CEEMDAN), Yuan Mingjuan; Sun Ruoying (2021) suggested that the LSTM neural network model performs better in price prediction, and all of these have significant value for future predictions of soybean futures prices. Wang Mengzhi; Ding Luoyang; Cui Xiaoyan (2022) used quantitative analysis methods to examine the price fluctuations of China's soybean and related agricultural products under the influence of target price policies. The research results show that the policy effectively reduced the volatility range of China's soybean prices and related market risks, and significantly improved the price correlation between soybeans and their products, which helps stabilize the prices of soybeans and related products.

Regarding the study of whether there is mutual influence between foreign futures prices and domestic futures prices, the following scholars have conducted research: Xiong Tao and Bao Yukun (2020) adopted the dynamic model averaging theory, while Chen Haodong and Sun Yongqing (2020) used the Beta-skew-t-EGARCH model to study the volatility patterns and characteristics of soybean futures prices. The results showed that soybean futures prices exhibit significant persistence and clustering. Liu Chao, Du Jiarong, and Mao Wenqian (2022) applied ARCH-type models to study the volatility characteristics of China's soybean futures. Wu Tongtong and Wang Renzeng (2019) aimed to quantify the impact of international soybean futures prices on China's soybean futures prices. Sun Yi and Qin Meng (2018) analyzed the relationship from both causal and dynamic correlation perspectives. Liu Kai and Mu Yueying (2017) conducted quantitative analysis using the E-GARCH model, BEKK-GARCH model, and DCC-GARCH model. Liu Lijun and Zhao Lisan (2017) studied the effect of soybean futures price changes on soybean oil futures price changes. The empirical analysis results indicate that there is a dynamic correlation between domestic soybean futures prices and foreign soybean futures prices.

2.2 Foreign Literature

International research on soybean futures price forecasting, as conducted by Miljkovic Dragan and Goetz Cole (2023), investigates whether futures markets exert stable or unstable influences on North American soybean spot prices. The study employs directed acyclic graphs (DAGs) to examine causal relationships among futures prices, spot prices, and end-of-period stocks, followed by time series econometric analysis. The findings demonstrate that futures markets significantly impact both the level and volatility of soybean spot prices in both short-term and long-term perspectives.

Tessmann Mathias Schneid and Carrasco Gutierrez Carlos Enrique (2022) investigated factors influencing corn and soybean futures prices on the Brazilian Stock Exchange (B3), with particular focus on the impact of international commodity prices on the domestic market. The study was based on the theoretical framework of Mundlack and Larson (1993) and adhered to the law of one price. By constructing an autoregressive distributed lag (ARDL) model and applying the cointegration test method proposed by Pesaran et al. (2001), the research examined whether there existed long-term stable relationships and short-term dynamic influences among variables. The dataset included B3-listed corn and soybean futures prices from February 2011 to December 2019, as well as corresponding corn, soybean, and oil prices traded on the Chicago Mercantile Exchange (CME) during the same period. Additionally, the study considered Brazil's macroeconomic indicators, including exchange rates, inflation rates, and Gross Domestic Product (GDP). The primary conclusion of the research revealed that domestic corn and soybean prices in Brazil maintain long-term stable relationships with international market prices and exchange rates in the United States. Notably, soybean prices are more susceptible to fluctuations in international markets. In the short term, soybean prices in the U.S. market significantly influence domestic soybean prices in Brazil.

Kogid Mori and Lily Jaratin (2022) analyzed the relationships between three palm oil indices listed on Malaysia's Bursa exchange and soybean and crude oil futures from January 2010 to June 2020. The findings revealed correlations across different time scales. The Malaysian Palm Index showed short-term connections with soybean and crude oil/palm oil markets, while the plantation index demonstrated short-term links with crude oil, crude oil/palm oil, and exchange rate markets. Based on these insights, the study recommends that investors focus on the crude oil futures market for long-term strategies, while maintaining attention to both crude oil and soybean futures in the short term to reduce risks and diversify their portfolios.

3. Related Concepts and Theoretical Basis

3.1 Definition of Related Concepts

3.1.1 Soybean Futures Prices

The futures market is a financial market for standardized forward contract trading, where buyers and sellers agree to deliver specific assets at predetermined prices on designated future dates. The soybean futures price, defined as the agreed-upon delivery price in soybean futures contracts, comprises several key elements: First, standardized contract terms that clearly specify the traded asset, delivery location, time, and scale—these form the foundation for transactions. Second, futures prices reflect collective market expectations of future value. Additionally, the "basis" —the difference between spot and futures prices—serves as a crucial indicator of market sentiment: when futures prices exceed spot prices (positive market), the basis becomes negative, often signaling tightening supply-demand conditions; conversely, a positive basis (negative market) indicates supply-demand balance. Finally, the actual delivery price at contract expiration typically fluctuates around futures prices, influenced by specific supply-demand dynamics and delivery location factors.

3.1.2 Soybean Futures Market

The futures market primarily involves three types of participants: speculators, hedgers, and institutional traders. Speculators seek profits by predicting market trends, while hedgers utilize futures contracts to hedge against price volatility risks of their physical assets. Institutional traders, typically large financial institutions or corporations, engage in futures trading to manage risks or achieve investment objectives. Soybean futures contracts allow investors to buy or sell soybeans at predetermined prices on specified dates. The Dalian Commodity Exchange offers two soybean contracts: Soybean No.1 and Soybean No.2. This market exists to meet the needs of various soybean stakeholders, including farmers, processors, traders, and investors. Farmers: As soybean producers, they may use futures markets to lock in future sales prices and mitigate price fluctuation risks. Processors: Soybean processors may employ futures markets to secure raw material prices, ensuring stable production costs. Traders: They trade soybeans through futures markets to profit from price volatility. Investors: They may engage in speculative activities in the soybean futures market, aiming to profit from price fluctuations.

3.2 Introduction to Relevant Theories

The theory of futures market is very complicated, which integrates the knowledge of finance, economics, statistics and risk management. It is very important for investors, company managers and policy makers to understand how the futures market works.

3.2.1 Basis Theory

The basis theory plays a crucial role in futures markets. Changes in the basis provide key information for market participants, helping them make trading decisions. Basis fluctuations reflect shifts in supply-demand dynamics, storage costs, transportation expenses, and other factors, which in turn influence market participants' expectations and behaviors. For instance, a positive basis may indicate optimism about future supply shortages or increased demand, while a negative basis could signal pessimism regarding potential supply surpluses or reduced demand. Basis movements also affect market volatility. When the basis converges, it suggests a more optimistic view of the relationship between spot and futures prices, potentially enhancing market stability. Conversely, widening basis gaps may increase market uncertainty and volatility. The existence of basis mechanisms facilitates price discovery and market efficiency. By analyzing basis movements, market participants gain better insights into supply-demand conditions and future price trends, enabling them to make more accurate trading decisions that promote rational price reflection and effective resource allocation.

3.2.2 The Theory of Rational Expectation Prices

The Rational Expectations Theory (RET) is a macroeconomic framework that explains asset price formation and volatility. It posits that rational market participants make decisions based on available information, causing asset prices to converge toward their intrinsic value. The theory's core concept, "rational expectations," refers to participants' forward-looking projections informed by all available data. These projections encompass factors like economic growth, inflation, and interest rates, significantly influencing various assets including stocks, bonds, and commodities. RET suggests that rational behavior drives asset prices to reflect market supply-demand dynamics and intrinsic value through information updates. However, this doesn't guarantee prices always accurately reflect intrinsic value, as participants' expectations may be influenced by psychological biases, herd behavior, and other market distortions.

3.2.3 Equilibrium Price Theory

The equilibrium price theory was first proposed by British economist Adam Smith in his seminal work *The Wealth of Nations*. Subsequent economic developments saw scholars like Alfred Marshall and John Maynard Keynes conduct in-depth research on this theory, proposing supplementary refinements. While futures market equilibrium pricing shares similarities with spot market equilibrium pricing, it differs in key aspects. Futures markets trade goods or assets for future delivery, not immediate physical exchange. Thus, equilibrium prices in futures markets are determined by the dynamic interplay between supply and demand.

4. Current Situation of Soybean Futures Market at Home and Abroad and Analysis of Factors Influencing Soybean Futures Price

4.1 Analysis of the Current Situation of Soybean Futures Market at Home and Abroad

The international soybean futures market is an important part of soybean international trade, and its price directly affects the global soybean imports, exports, and trade flows. As the world's largest soybean importer, China's soybean market dynamics have a profound impact on domestic food security and international agricultural trade. Therefore, in China's financial sector, the soybean futures market plays a crucial role. It promotes the diversification of financial markets and enhances the operational efficiency and stability of the soybean market.

4.1.1 Current Situation of International Soybean Futures Market

Over the past decade, global soybean production and consumption have both increased, but the growth rate and trend vary depending on national, regional, and market factors. With advancements in technology and expanded planting areas, the United States has maintained its leading position in soybean production worldwide, with growth observed over the past decade. Brazil and Argentina have also seen steady increases in soybean production, though at a relatively slower pace. China's soybean production has remained relatively stable, with no significant overall growth, as soybean cultivation in China is constrained by land resources and agricultural policies. Apart from these major soybean-producing countries, some other nations and regions also cultivate soybeans, but with relatively smaller yields. The top five countries in soybean planting area are Argentina, Brazil, the United States, India, and China. Over 80% of the world's soybeans are produced in the United States, Brazil, and Argentina. Since 2018, Brazil has surpassed the United States in both soybean production and planting area to become the world's largest producer. Currently, China ranks fifth in planting area and fourth in production capacity globally, as shown in Figure 1.

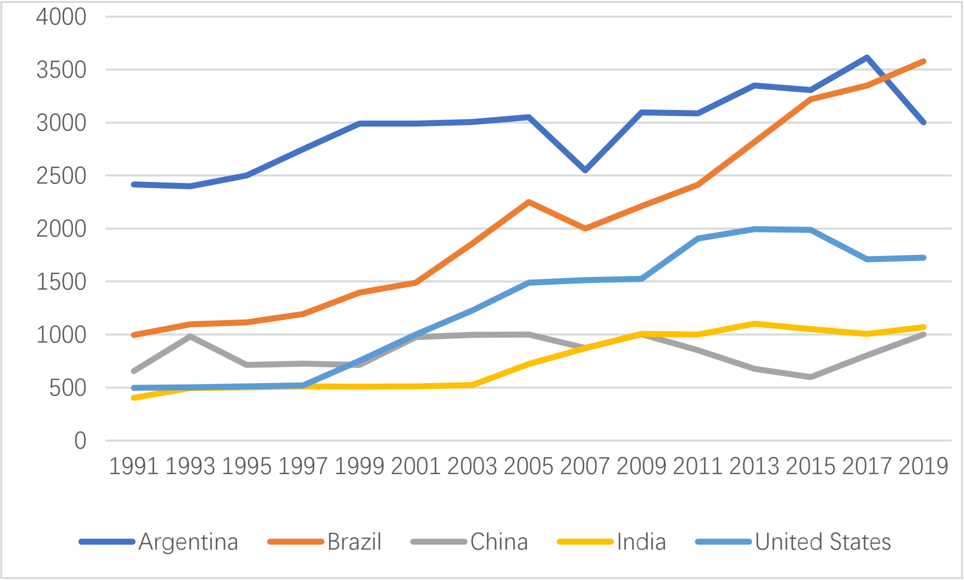

Figure 1. Soybean Cultivation Area (unit: 10,000 hectares)

Soybean production in Brazil, the United States, and Argentina has shown an overall upward trend. Compared to Argentina, the growth in the U.S. and Brazil has been more stable, with all three countries maintaining output levels around 30,000 kg per hectare. China and India have also maintained relatively stable production. While China's soybean output remains relatively low, its massive domestic demand necessitates soybean imports from other countries to meet domestic needs. Although policy support in recent years has led to some increase in soybean production, it still falls short of meeting the country's daily demand, as illustrated in Figure 2.

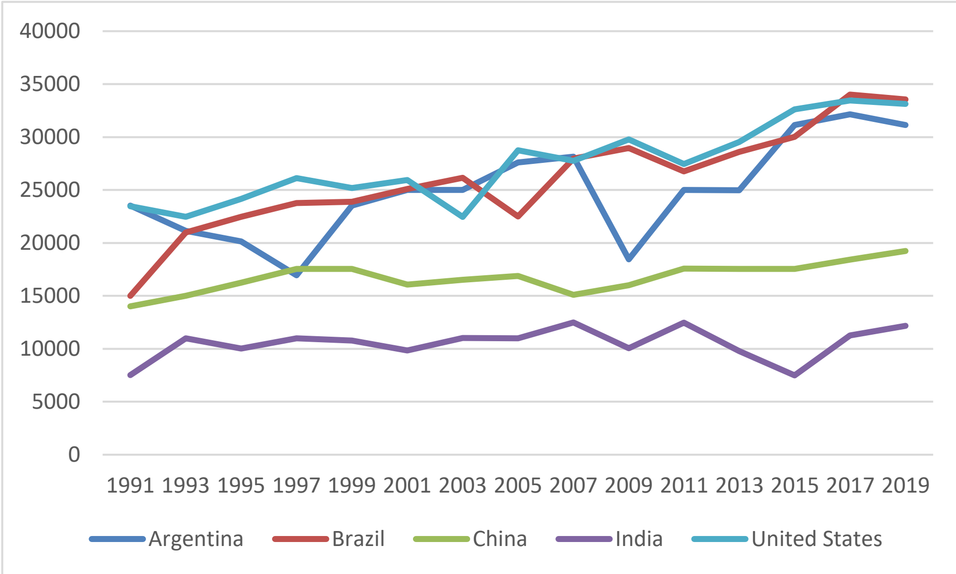

Figure 2. Soybean Yield (kg/ha)

4.1.2 Current Situation of Soybean Futures Market in China

China's soybean production is mainly concentrated in the northeastern region, particularly in provinces such as Heilongjiang, Jilin, and Liaoning. In addition, China's soybean production is also distributed to some extent in other provinces, such as Hebei, Inner Mongolia, and Jiangsu. However, the northeastern region remains the main production area for China's soybeans. From 2011 to 2015, China's soybean planting area gradually decreased, reaching a low of 6.8274 million hectares. Since 2016, China's soybean planting area has started to increase, reaching 9.8667 million hectares by 2020, as shown in Figure 3.

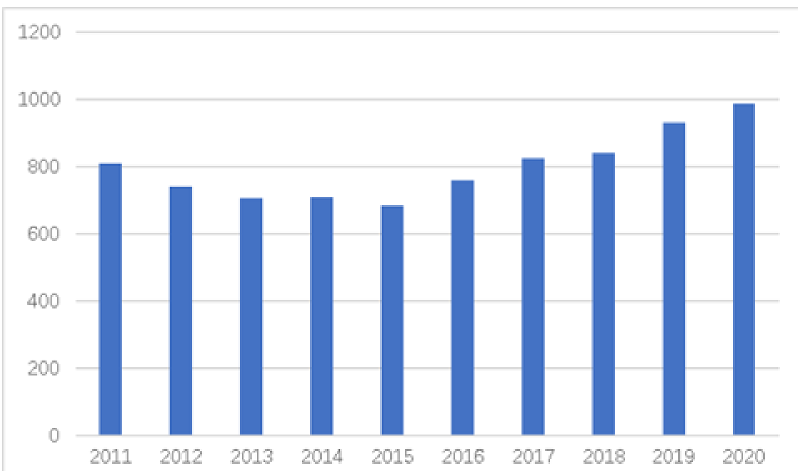

Figure 3. Trends in Soybean Planting Area in China (unit: 10,000 hectares)

USDA data reveals that global soybean inventories have followed a pattern of initial growth followed by decline since 2013. The 2016 yield per unit area saw a decrease, prompting China to prioritize the soybean industry and implement a series of supportive policies. From 2016 to 2020, China's soybean production and planting area experienced significant growth, with output peaking at 19.6 million tons. As shown in Figure 4, both production and cultivation area have maintained steady growth since 2016.

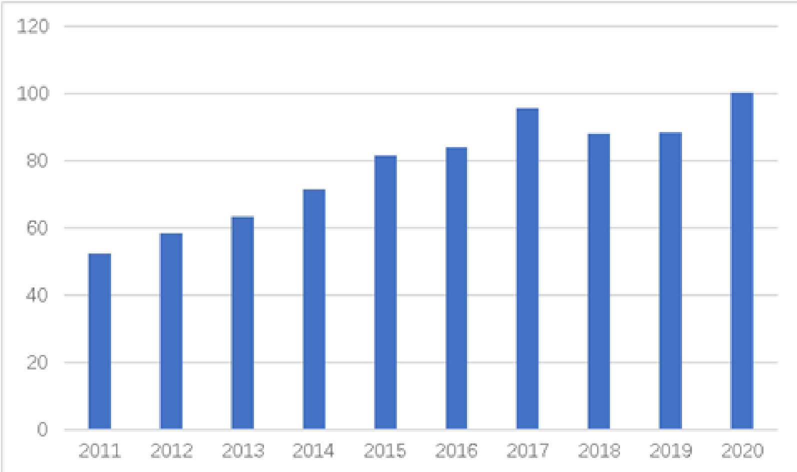

Figure 4. Changes in China's Soybean Imports (unit: million tons)

Soybean futures contracts were first listed on the Dalian Commodity Exchange (DCE) on May 16,1993, marking soybeans 'debut as a traded commodity on the exchange. Since then, soybean futures have become a key agricultural futures product on DCE, providing investors with access to the soybean market while offering effective risk management tools for producers, traders, and consumers across the soybean supply chain. In 2020, China's Yellow Soybean No.1 futures saw total trading volume of 59.4451 million lots, representing a 222.19% year-on-year increase with a transaction value of 2.79683 trillion yuan (up 335.5% YoY). Yellow Soybean No.2 futures recorded 18.3596 million lots traded, showing a 3.19% YoY increase in volume and 14.52% YoY growth in value, largely influenced by pandemic-related disruptions. The total agricultural futures trading volume in 2020 reached 976,892,265,600 yuan, with Yellow Soybean No.1 and No.2 contributing 3.5% of the total.

In the domestic market, the price of Dalian Commodity Exchange's Yellow Soybean No.1 futures exhibited a downward trend in 2023. While domestic soybean prices maintained an upward trajectory during the first quarter, the period from April to June saw a decline as policy-driven purchases concluded. Although Inner Mongolia and Heilongjiang initiated local reserve purchases, the acquisition volume remained insufficient amid weak domestic demand. From July to September, U.S. soybean prices continued to rise, coupled with intensified customs quarantine measures on imported soybeans, which slowed market penetration. This drove up domestic soybean meal and second-phase soybean prices, subsequently pushing up first-phase soybean prices. Post-Q4, occasional policy-induced rallies occurred sporadically, but the persistent oversupply in the domestic market kept futures prices under pressure and trending downward. Overall, the futures price of Yellow Soybean No.1 maintained a downward trajectory.

Future price movements will require analysis of global soybean production conditions. Although sufficient supply exists, certain impacts may still emerge, as illustrated in Figure 5.

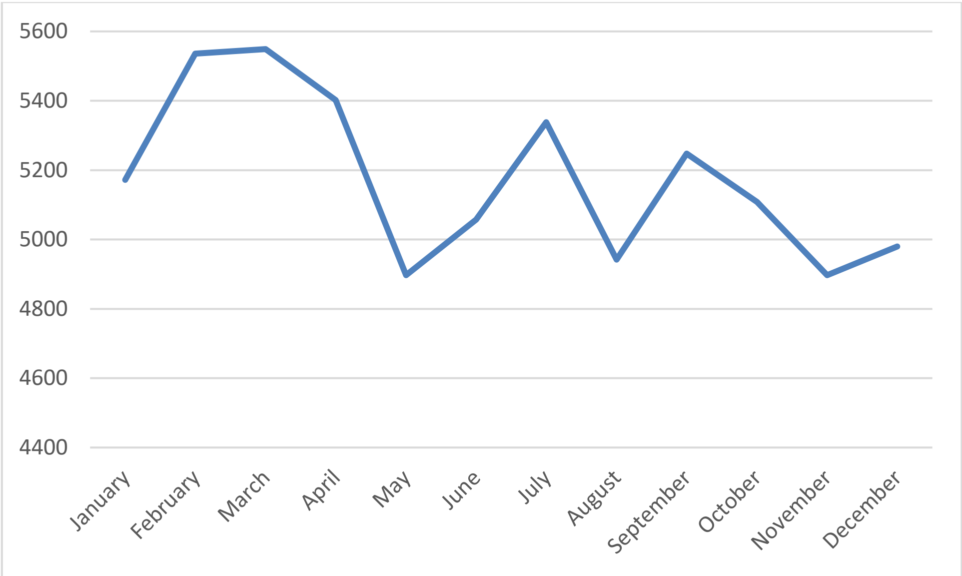

Figure 5. Price Trend of Yellow Soybean No.1

4.2 Factors Affecting Soybean Futures Prices

4.2.1 Factors Related to the Spot Market

Analyzing the factors influencing the spot market is crucial for understanding soybean futures prices. These prices are affected by various spot market elements, including soybean supply-demand dynamics, production costs, and China's soybean cultivation area. By examining these factors, we can better grasp the price trends of soybean futures, providing investors with actionable insights to formulate trading strategies.

4.2.1.1 Price Index of Agricultural Production Materials

The agricultural production materials price index is a key indicator that tracks price fluctuations of essential raw materials and tools for farming, including but not limited to pesticides, fertilizers, seeds, and agricultural machinery. Changes in this index reflect shifts in production costs, which in turn affect farmers' economic conditions and the supply of agricultural products.

The agricultural production materials price index is published by government agencies, industry associations, or independent research institutions. These indices help agricultural producers, policymakers, and investors track cost trends in agricultural production, guiding production practices, policy-making, and investment decisions. Fluctuations in agricultural production material prices can directly impact soybean cultivation costs. When material prices rise, growers face increased expenses, which may lead to reduced soybean acreage or higher selling prices to offset costs. This supply adjustment ultimately affects soybean futures prices. Moreover, changes in production material prices can also influence the soybean supply chain.

4.2.1.2 Soybean supply and demand relationship

In 2020, China's soybean imports exceeded the 100 million ton mark for the first time, accounting for 70.3% of its total grain imports, reflecting the country's dependence on international markets. Due to limited arable land, the difficulty in significantly increasing grain cultivation areas, and uneven water resource distribution, these factors have all impacted soybean production. Therefore, effectively utilizing international markets, expanding import channels, stabilizing supply chains and industrial chains, and further enhancing the value chain are crucial for ensuring soybean supply security. First, in 2023, China's soybean planting area and output continued to grow, while imports also increased, leading to a significant rise in the overall domestic soybean supply. Although edible demand remained relatively stable, feed demand declined, resulting in weak domestic soybean demand and a trend toward a loose market supply-demand situation. It is estimated that in the 2023/2024 season, global soybean ending stocks will increase by 12.73 million tons compared to the previous year, reaching 115 million tons. To enhance the resilience of the soybean supply chain, the Chinese government has implemented a series of policy measures, including increasing subsidies for domestic soybean producers, strengthening financial credit support, and promoting intercropping models between soybeans and other crops.

In 2023, China's soybean production achieved growth for the second consecutive year, reaching 20.84 million tons, an increase of 560,000 tons compared to the previous year. This growth was attributed to the expansion of soybean planting areas, which increased by 3.451 million mu to 157 million mu. Despite the improvement in domestic production capacity, China's import demand for soybeans remained strong, with imports reaching 99.409 million tons in 2023, representing an annual growth rate of 11.4%. The domestic market's demand for edible soybeans remained relatively stable, while feed demand declined, leading to overall insufficient demand and relatively ample market supply. This supply-demand situation may result in soybean inventories remaining at high levels. Although production increased and imports remained high, the stable demand for soybeans in feed and edible oil sectors is expected to keep inventory levels elevated. In 2023, China's soybean imports significantly increased to 99.409 million tons, up 11.4% from the previous year, highlighting China's strong dependence on the global soybean market. Meanwhile, domestic soybean production also showed a positive growth trend, with output rising to 20.84 million tons in 2023, an increase of 560,000 tons compared to the previous year, marking the second consecutive year of growth. Additionally, soybean planting areas expanded by 3.451 million mu to 157 million mu.

4.2.1.3 Soybean costs

The direct costs of soybean production encompass seeds, fertilizers, pesticides, irrigation, machinery, and labor. Rising costs typically compel farmers to reduce planting acreage or seek higher selling prices to maintain profitability, potentially shrinking market supply and driving up futures prices. Transportation and storage costs also influence soybean futures. For instance, higher oil prices increase transportation costs, while elevated storage fees may prompt farmers to sell their harvest more quickly. These factors collectively affect both soybean supply and futures prices.

4.2.1.4 Prices of alternative products

Soybean has numerous substitutes, including edible alternatives such as pea protein, wheat protein, barley protein, and oat protein, as well as oil-based options like rapeseed oil, palm oil, and peanut oil. For feed applications, alternatives include corn and wheat bran. These soybean substitutes cater to diverse market needs, spanning food and feed to industrial uses. Fluctuations in their prices, availability, and consumer preferences significantly influence the market dynamics of soybeans and their derivatives. The impact of soybean substitutes on futures prices primarily stems from supply-demand mechanisms. Changes in substitute prices, availability, or consumer preferences directly affect soybean demand, which in turn impacts both market and futures prices.

4.2.2 Factors Related to the Futures Market

Beyond the aforementioned spot market factors, the impact of futures market elements on soybean futures prices requires thorough analysis. These include the closing prices of the soybean oil index, soybean meal index, and US dollar index. By studying price fluctuations in futures products, we can analyze how these market factors influence soybean futures. Therefore, futures market participants must consider these factors and their potential changes to predict price trends.

4.2.2.1 Closing price of the soybean oil index

The closing price of the soybean oil index typically influences soybean futures prices, particularly when market demand and supply dynamics are active. This is because the index reflects the market price trend of soybean oil, a key processed product derived from soybeans. When soybean oil supply tightens or demand increases, the index may rise, driving up soybean futures prices. Conversely, if supply remains ample or demand declines, the index could fall, leading to lower soybean futures prices. As a primary soybean derivative, soybean oil often exhibits a substitution relationship with soybean futures in the market.

4.2.2.2 Closing price of the soybean meal index

The closing price of the soybean meal index has a significant impact on soybean futures prices, as soybean meal is one of the main by-products of soybean crushing, and soybean futures prices reflect market expectations of soybean supply and demand. The following is an analysis of the specific influencing factors and mechanisms: Soybean meal is primarily used in feed manufacturing, especially in the pig and poultry farming industries. With the growth of domestic soybean meal consumption demand and the reduction in imported soybean supply, China's demand for soybean meal will continue to rise, but the price of imported soybeans may decline. When the demand for soybean meal increases, the price of soybean meal will also rise, and this trend usually affects the soybean futures market, thereby pushing up soybean futures prices. There is a long-term equilibrium relationship between soybean futures prices and crushing profits. Crushing profits refer to the total income that crushing plants obtain from soybean meal and soybean oil through crushing, minus the costs of purchasing soybeans. The planting area of soybeans to some extent determines the level of crushing profits. If the price of soybean meal rises while the price of soybeans remains relatively stable, the crushing profits may increase, which could prompt crushing plants to increase their soybean purchases, thereby pushing up soybean futures prices. Fluctuations in soybean and soybean meal prices also have a significant impact on international agricultural product prices. Both soybeans and soybean meal are key commodities in international trade. In the international market, the prices of soybean meal and soybean oil are influenced by the global economic situation, particularly the U.S. economy. Commercial exchanges and policy adjustments between major producing and consuming countries may affect market prices. The export volume of soybeans and soybean meal in the United States, China, and other countries is directly linked to international prices. Therefore, an increase in the demand for soybean meal exports can also cause fluctuations in the soybean futures market. If the export demand for soybean meal remains strong, it will stimulate the import demand for soybeans, thereby affecting the futures prices of soybeans.

4.2.2.3 The closing price of the US Dollar Index

The Dollar Index serves as a benchmark for quantifying the value of the US dollar relative to its major trading partner currencies. By analyzing and comparing data, it helps determine a country's or region's status and role within the global economic system. The index tracks the dollar's exchange rate fluctuations against a basket of major currencies. An increase in the Dollar Index typically indicates a stronger US dollar, while a decline reflects weaker currencies. These price movements significantly impact commodities like soybeans, as many products are priced in US dollars. A sustained dollar depreciation could drive up soybean prices. Given the dollar's dominant position, rising costs of soybeans denominated in other currencies might reduce overseas buyers' interest in US soybeans, potentially causing soybean futures prices to fall. The Dollar Index also indirectly affects US inflation by influencing domestic price levels. Its fluctuations are closely linked to inflation rates and monetary policies. As inflation continues to rise, expectations of dollar depreciation intensify.

4.2.3 Other Influencing Factors

4.2.3.1 The exchange rate of the US dollar

The US dollar exchange rate and soybean futures prices are interconnected, though not directly correlated. A stronger dollar (rising exchange rate) makes American soybeans more expensive for foreign buyers, potentially reducing global demand and causing soybean futures prices to drop. Conversely, a weaker dollar (falling exchange rate) makes US soybeans more competitive internationally, which could boost export volumes and support soybean futures prices. A stronger dollar typically attracts more investment into dollar-denominated assets like US Treasury bonds, potentially decreasing demand for commodities such as soybeans due to their higher risk compared to fixed-income investments. This capital flow shift may exert downward pressure on soybean futures prices. On the flip side, when the dollar weakens, investors may seek safe-haven assets or other currencies that benefit from depreciation, such as commodities, which could drive up soybean futures prices. As soybeans are a global traded commodity, fluctuations in the dollar exchange rate also affect exchange rates between other currencies and the US dollar, ultimately impacting soybean import costs and volumes in these countries. These factors collectively influence global soybean supply-demand dynamics and prices. In summary, changes in the dollar exchange rate indirectly affect soybean futures prices by altering export competitiveness, capital flows, and global market supply-demand relationships.

4.2.1.2 Loan Market Quotation Rate

The financing costs for agricultural producers and soybean traders are directly affected by changes in the Loan Prime Rate (LPR). A reduction in LPR may lower borrowing costs for these entities, potentially encouraging them to expand cultivation areas or increase inventory levels. This could lead to higher soybean supply and potentially lower futures prices. Conversely, an increase in LPR may raise financing costs, which could restrict production and stockpiling, resulting in reduced market supply and further driving up soybean futures prices. LPR influences overall market interest rates. In low-interest-rate environments, investors and speculators may prefer entering commodity markets like soybean futures due to their relatively lower financing costs. While soybean futures prices exert some influence on spot prices, this effect remains limited. Increased speculative activity could potentially drive up soybean futures prices.

5. Empirical Analysis of the Factors Affecting the Soybean Futures Price in China

5.1 Sample Selection and Data Sources

In Chapter 3, we examine the determinants of soybean futures prices through three dimensions: macroeconomic factors, microeconomic factors, and other variables. These factors are categorized into 10 subcategories, with particular challenges in quantifying public expectations and psychological factors, information availability, weather conditions, seasonal variations, soybean supply-demand dynamics, and national policies. To assess the relative influence of these factors, we employ 15 specific indicators, as detailed in Table 1.

Table 1. Indicators for Each Factor

macroeconomic factor	microeconomic factors	other factor
Agricultural Product Production Index (X1)	China's soybean production (X6)	China's soybean harvest area (X15)
Price Index of Agricultural Production Materials (X2)	China's soybean consumption (X7)	
Dollar Index closing price (X3)	China's soybean export volume (X8)	
RMB exchange rate (X4)	China's soybean import volume (X9)	
Loan Market Quoted Rate (X5)	China's Soybean Production Cost (X10)	
	Monthly Average Prices of Soybean Substitutes (X11)	
	Monthly Soybean Price Index (X12) in China	
	Soybean Meal Index Closing Price (X13)	
	Soybean Oil Index Closing Price (X14)	

The data in this paper are sourced from the official websites of State Council departments, the National Bureau of Statistics, and other relevant sources. The soybean production cost (X10) data in China is derived from the "National Agricultural Product Cost and Benefit Compilation 2023".

The data on China's soybean export volume (X8), soybean import volume (X9), soybean production volume (X6), soybean production cost (X10), and soybean harvest area (X15) are sourced from the official websites of the State Council departments.

The RMB exchange rate (X4) data is sourced from the People's Bank of China.

The following data are sourced from East Money Network: the closing price of the US dollar index (X3), China's monthly soybean spot price (X12), monthly spot prices of soybean substitutes (X11), monthly spot closing prices of soybean meal (X13), and monthly spot closing prices of soybean oil (X14).

The Agricultural Production Index (X1) data is sourced from CEIC.

The Loan Prime Rate (LPR) data is sourced from the People's Bank of China.

China's soybean consumption data (X7) is sourced from the China Statistical Yearbook.

The data of the price index of agricultural production materials (X2) are from the National Bureau of Statistics.

The agricultural production material price index (X2), soybean consumption quantity (X7), soybean production cost (X10), soybean substitute price (X11) are missing, so the SPSS is used to replace the missing value, the method of selection is the linear trend of the adjacent point, and the new data is obtained.

5.2 Variable Selection

5.2.1 Dependent Variable

As the dependent variable in this paper, the soybean futures price is analyzed in chapter 3, and the quantifiable factors are selected. In chapter 4, the principal component analysis is used to obtain the main factors affecting the soybean price, and then the factors with positive or negative correlation with the soybean futures price are analyzed through matrix analysis.

5.2.2 Explanatory Variables

After eliminating non-quantifiable factors, the selected explanatory variables comprise: Agricultural Product Production Index (X1), Agricultural Production Materials Price Index (X2), US Dollar Index Closing Price (X3), Renminbi Exchange Rate (X4), Loan Market Quoted Rate (X5), China's Soybean Production (X6), Soybean Consumption Volume (X7), Soybean Export Volume (X8), Soybean Import Volume (X9), Soybean Production Cost (X10), Soybean Substitute Continuously Price (X11), Soybean Continuously Price (X12), Soybean Meal Index Closing Price (X13), Soybean Oil Index Closing Price (X14), and Soybean Harvest Area (X15), totaling 15 variables.

5.3 Model Design

This study employs Principal Component Analysis (PCA) and correlation coefficient analysis to examine and select 15 factors. PCA transforms high-dimensional data into low-dimensional representations, retaining essential information while reducing storage space and computational complexity. By extracting the most significant principal components, PCA helps identify and interpret key features in the data while removing noise and redundant information. This approach effectively minimizes data storage and processing requirements without substantial information loss. PCA converts raw data into a new coordinate system through covariance matrices, ensuring the new features remain mutually independent (i.e., uncorrelated), which is crucial for subsequent data analysis and modeling. The primary objectives of applying PCA in this study are to identify major factors influencing soybean futures prices, eliminate non-significant factors, and subsequently conduct correlation coefficient analysis. Using soybean futures prices as the dependent variable and PCA-calculated variables as independent variables, a linear regression equation is established to determine the impact magnitude and direction of each factor on the dependent variable. The specific operational procedures are as follows:

(1) Process the selected data using SPSS software to fill in missing values.

(2) The principal component analysis was performed to calculate the total variance, common factor variance, component matrix and scatter plot.

(3) Multiple regression analysis was performed.

(4) Select the main influencing factors, and analyze the correlation coefficient, and draw the conclusion.

5.4 The Process of Empirical Analysis

5.4.1 Data Standardization and Matrix Construction

First, SPSS software was used to standardize the data, and the correlation matrix R of each influencing factor was obtained, as shown in Table 2.

Table 2. Correlation Matrix

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15
X1	1.000	.612	.021	.296	.039	.225	-.011	.017	.043	-.123	-.138	-.463	-.442	-.379	.213
X2	.612	1.000	.035	.433	-.126	.492	.033	.156	.096	.083	.043	-.131	-.277	.120	.469
X3	.021	.035	1.000	.780	-.841	.661	.893	-.681	.854	.672	.557	-.311	-.196	-.106	.671
X4	.296	.433	.780	1.000	-.573	.703	.674	-.450	.731	.438	.418	-.224	-.203	-.043	.724
X5	.039	-.126	-.841	-.573	1.000	-.753	-.911	.817	-.907	-.901	-.733	.115	-.059	-.018	-.715
X6	.225	.492	.661	.703	-.753	1.000	.817	-.545	.747	.845	.835	.152	.212	.337	.994
X7	-.011	.033	.893	.674	-.911	.817	1.000	-.834	.930	.882	.804	-.057	.096	.064	.811
X8	.017	.156	-.681	-.450	.817	-.545	-.834	1.000	-.903	-.735	-.582	.152	-.160	.230	-.501
X9	.043	.096	.854	.731	-.907	.747	.930	-.903	1.000	.806	.682	-.191	.032	-.138	.722
X10	-.123	.083	.672	.438	-.901	.845	.882	-.735	.806	1.000	.939	.257	.414	.332	.818
X11	-.138	.043	.557	.418	-.733	.835	.804	-.582	.682	.939	1.000	.433	.538	.464	.834
X12	-.463	-.131	-.311	-.224	.115	.152	-.057	.152	-.191	.257	.433	1.000	.909	.893	.168
X13	-.442	-.277	-.196	-.203	-.059	.212	.096	-.160	.032	.414	.538	.909	1.000	.695	.207
X14	-.379	.120	-.106	-.043	-.018	.337	.064	.230	-.138	.332	.464	.893	.695	1.000	.363
X15	.213	.469	.671	.724	-.715	.994	.811	-.501	.722	.818	.834	.168	.207	.363	1.000

5.4.2 The Process and Results of Principal Component Analysis

This study employs SPSS software to analyze 15 variables, identifying key factors that significantly influence soybean futures prices. The results demonstrate that common factor variance serves as a crucial statistical metric, enabling researchers to better understand inter-variable relationships. Common factor variance refers to the total variance attributable to common factors among all observed variables in factor analysis (Table 3). By examining this variance, we can discern the interactive dynamics between variables. When two variables exhibit relatively high common factor variance, they demonstrate stronger correlations within shared factors. To effectively extract common factor information, this study calculates each sample's common factor variance to assess variable correlations. Variables with low common factor variance indicate weak connections to shared factors, suggesting they may not require inclusion in the factor analysis process.

Table 3. Common Factor Variance

	initial	draw
X1	1.000	.708
X2	1.000	.885
X3	1.000	.854
X4	1.000	.726
X5	1.000	.897
X6	1.000	.981
X7	1.000	.969
X8	1.000	.842
X9	1.000	.955
X10	1.000	.938
X11	1.000	.917
X12	1.000	.972
X13	1.000	.863
X14	1.000	.896
X15	1.000	.969

Extraction method: Principal Component Analysis

Total explained variance (TEV) measures a model's explanatory power. A high TEV indicates strong explanatory capacity, meaning the model effectively captures key data variations. This helps us better understand individual factors and identify which ones play a central role in explaining the data.

The principal component factor is extracted from the total variance of the variables, and the three principal component factors are extracted from the software. The three principal component factors can explain 89.159% of the total variance, and can represent 89.159% of the fifteen indicators, as shown in Table 4.

Table 4. Total Variance Explanation

ingredient	amount to	Initial eigenvalue variance percentage	accumulative total %	amount to	Extract the percentage of the sum of squares and variance of the load	accumulative total
1	7.864	52.414	52.414	7.862	52.414	52.414
2	3.511	23.406	75.820	3.511	23.406	75.820
3	2.001	13.340	89.159	2.001	13.340	89.159
4	.677	4.515				
5	.398	2.656				
6	.288	1.918				
7	.126	.842				
8	.081	.540				
9	.043	.288				
10	.010	.067				
11	.002	.014				
12	4.463E-16	2.975E-15				
13	2.427E-16	1.618E-15				
14	4.937E-17	3.291E-16	100.00			
15	-4.993E-16	-3.328E-15	100.00			

The steeple graph, constructed by plotting and connecting eigenvalues, displays a descending curve where points are arranged in descending order of height. This visual representation illustrates the variance contribution of each common factor. The curve's inflection points indicate the gradual decline in variance contribution until reaching a relatively stable phase. By identifying these inflection points, we can determine an optimal number of factors that retain sufficient variance while minimizing unnecessary components. The steeple graph reveals Principal Factor 1 as the steepest, followed by Principal Factor 2 and Principal Factor 3, with other factors exhibiting smaller eigenvalues, as shown in Figure 6.

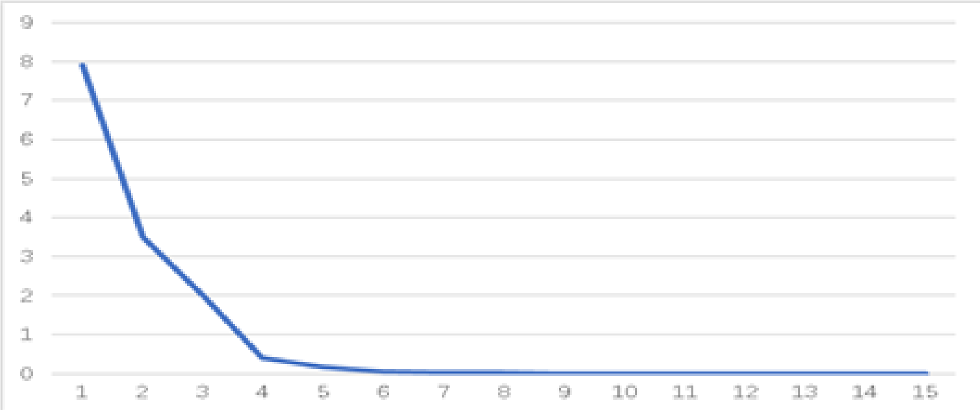

Figure 6. Stone Fragmentation Diagram

The component matrix reveals three principal components with significant eigenvalues. The first component comprises 10 factors: USD index closing price (X3), RMB exchange rate (X4), Loan Market Quotation Rate (X5), China's soybean production (X6), soybean consumption volume (X7), soybean export volume (X8), soybean import volume (X9), soybean production cost (X10), soybean substitute monthly consecutive price (X11), and soybean harvest area (X15). The second component consists of four factors: agricultural production index (X1), soybean monthly consecutive price (X12), soybean meal index closing price (X13), and soybean oil index closing price (X14). The third component includes agricultural production index (X1) and agricultural production materials price index (X2). These analyses yield three principal component matrices as shown in Table 5.

Table 5. Component Matrix

	1	2	3
X7	.965	-.068	-.182
X10	.928	.266	-.078
X9	.927	-.216	-.222
X5	-.921	.101	.196
X6	.916	.064	.371
X15	.903	.076	.383
X11	.860	.419	.024
X3	.843	-.318	-.207
X8	-.784	.138	.456
X4	.726	-.367	.254
X12	.043	.970	.175
X13	.189	.908	-.053
X14	.170	.848	.384

X1	.049	-.608	.580
X2	.210	-.289	.871

Extraction method: principal component analysis

Three components were extracted

The factor model with four principal factors can be obtained from the factor loading matrix.

Agricultural production index =0.049F1-0.608F2+0.58F3

Agricultural production materials price index =0.21F1-0.289F2+0.871F3

Dollar index closing price =0.843F1-0.318F2-0.207F3

RMB exchange rate = 0.726F1-0.367F2+0.254F3

Loan market quoted rate = -0.921F1+0.101F2+0.196F3

China's soybean yield =0.916F1+0.064F2+0.371F3

China's soybean consumption quantity =0.965F1-0.068F2-0.182F3

China's soybean export volume = -0.784F1+0.138F2+0.456F3

China's soybean import volume =0.927F1-0.216F2-0.222F3

China's soybean production cost =0.928F1+0.266F2-0.078F3

Monthly continuous price of soybean substitutes = 0.860F1+0.419F2+0.024F3

The monthly continuous price of soybean in China =0.043F1+0.97F2+0.175F3

Soybean meal index closing price = 0.189F1+0.908F2-0.053F3

Soybean oil index closing price = 0.17F1+0.848F2+0.384F3

China's soybean harvest area =0.906F1+0.076F2+0.383F3

The rotated score coefficient matrix is shown in Table 4-6:

Table 6. Matrix of Component Score Coefficients

	1	2	3
X1	.006	-.173	.290
X2	.027	-.082	.435
X3	.107	-.091	-.103
X4	.092	-.105	.127
X5	-.117	.029	.098
X6	.117	.018	.185
X7	.123	-.019	-.091
X8	-.100	.039	.228
X9	.118	-.062	-.111
X10	.118	.076	-.039
X11	.109	.119	.012

X12	.005	.276	.087
X13	.024	.259	-.027
X14	.022	.242	.192
X15	.115	.022	.192

Extraction method: principal component analysis

Component Score: F1=0.006 Agricultural Production Index + 0.027 Agricultural Production Materials Price Index + 0.107 US Dollar Index Closing Price + 0.092 RMB Exchange Rate-0.117 Loan Market Quoted Rate + 0.117 China's Soybean Production + 0.123 China's Soybean Consumption Volume-0.1 China's Soybean Export Volume + 0.118 China's Soybean Import Volume + 0.118 China's Soybean Production Cost + 0.109 Soybean Substitute Continuous Price + 0.005 China's Soybean Continuous Price + 0.024 Soybean Meal Index Closing Price + 0.022 Soybean Oil Index Closing Price + 0.115 China's Soybean Harvest Area

F2=-0.173 (Agricultural Product Production Index) -0.082 (Agricultural Production Materials Price Index) -0.091 (US Dollar Index Closing Price) -0.105 (RMB Exchange Rate) +0.029 (Loan Market Quoted Rate) +0.018 (China's Soybean Production) -0.019 (China's Soybean Consumption) +0.039 (China's Soybean Exports) -0.062 (China's Soybean Imports) +0.076 (China's Soybean Production Costs) +0.119 (Soybean Substitute Continuously Price) +0.276 (China's Soybean Continuously Price) +0.259 (Soybean Meal Index Closing Price) +0.242 (Soybean Oil Index Closing Price) +0.022 (China's Soybean Harvest Area)

F3=0.29 Agricultural Production Index + 0.435 Agricultural Production Materials Price Index-0.103 USD Index Closing Price + 0.127 RMB Exchange Rate + 0.098 Loan Market Quoted Rate + 0.185 China's Soybean Production-0.091 China's Soybean Consumption + 0.228 China's Soybean Export Volume-0.111 China's Soybean Import Volume-0.039 China's Soybean Production Cost + 0.012 Soybean Substitute Continuous Price + 0.087 China's Soybean Continuous Price-0.027 Soybean Meal Index Closing Price + 0.192 Soybean Oil Index Closing Price + 0.192 China's Soybean Harvest Area.

5.4.3 Linear Regression Analysis and Results

The linear regression equation was calculated with the above obtained F1, F2 and F3 as independent variables and soybean futures price as dependent variable by SPSS software. The calculation results are shown in Table 4-7. The multiple regression results show that the coefficient of determination of the equation is 0.986 and the modified coefficient of determination is 0.973, which can be concluded that the equation has a good fitting degree.

Table 7. Model Summary

model	R	R Fang	adjusted R-squared	standard error of estimation	Debin-Watson
1	.986a	.973	.963	42.65297	2.617

Predictive variables: (constant), REGR factor score 3 for analysis 4, REGR factor score 2 for analysis 4, REGR factor score 1 for analysis 4

Dependent variable: Soybean futures price

The regression ANOVA test showed a significance level below 0.001, indicating the model was statistically significant (see Table 8).

Table 8. ANOVAa

model		quadratic sum	free degree	mean square	F	conspicuousness
1	regression	525643.935	3	175214.645	96.310	<.001b
	residual	14554.209	8	1819.276		
	amount to	540198.144	11			

a. Dependent variable: Soybean futures price

b. Predictive variables: (constant), REGR factor score 3 for analysis 4, REGR factor score 2 for analysis 4, REGR factor score 1 for analysis 4

It can be concluded from Table 4-9 that the T value of F1 is not obvious, and F2 and F3 are the main factors. The equation of soybean futures price is as follows: soybean futures price = 1145.826+9.583F1+214.898F2+38.897F3

From the analysis of the correlation matrix, the 13 factors that make up the first and second principal factors are the most significant factors to the soybean futures price.

Table 9. Coefficient a

model		B	Standard Error	Beta	t	conspicuousness	tolerance	VIF
1	(constant)	1145.826	12.313		93.059	<.001		
	REGR factor score 1 for analysis 4	9.583	12.860	.043	.745	.478	1.000	1.000
	REGR factor score 2 for analysis 4	214.898	12.860	.970	16.710	<.001	1.000	1.000
	REGR factor score 3 for analysis 4	38.897	12.860	.176	3.025	.016	1.000	1.000

Dependent variable: Soybean futures price

The correlation coefficient matrix shows that the soybean futures price is negatively correlated with the closing price of the US dollar index (X3), the exchange rate of RMB (X4), the consumption quantity of soybean in China (X7) and the import quantity of soybean in China (X9), and positively correlated with the other factors.

The correlation coefficient is shown in Table 10.

Table 10. Correlation Coefficient Matrix

	soybean futures price	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15
soybean futures price	1													
X3	-.311	1												
X4	-.224	.780**	1											
X5	.114	-.841**	-.573	1										
X6	.153	.661*	.703*	-.753**	1									
X7	-.057	.893**	.674*	-.911**	.817**	1								
X8	.153	-.681*	-.450	.817**	-.545	-.834**	1							
X9	-.191	.854**	.731**	-.907**	.747**	.930**	-.903**	1						
X10	.258	.672*	.438	-.901**	.845**	.882**	-.735**	.806**	1					
X11	.434	.557	.418	-.733**	.835**	.804**	-.582*	.682*	.939**	1				
X12	1.000**	-.311	-.224	.115	.152	-.057	.152	-.191	.257	.433	1			
X13	.909**	-.196	-.203	-.059	.212	.096	-.160	.032	.414	.538	.909**	1		
X14	.894**	-.106	-.043	-.018	.337	.064	.230	-.138	.332	.464	.893**	.695*	1	
X15	.169	.671*	.724**	-.715**	.994**	.811**	-.501	.722**	.818**	.834**	.168	.207	.363	1

**. Significant at the 0.01 level (two-tailed)

*. Significant at the 0.05 level (two-tailed)

5.5 Empirical Results Analysis

Principal component analysis (PCA) was applied to 15 factors, yielding three principal components. Linear regression analysis revealed that F1, F2, and F3 components accounted for 52.414%,23.406%, and 13.34% of the variance, respectively. This indicates that F1 has the most significant impact on soybean futures prices. F1 is composed of ten factors: the closing price of the US dollar index, the RMB exchange rate, the Loan Prime Rate (LPR), China's soybean production, soybean consumption volume, soybean export volume, soybean import volume, soybean production costs, the current month's consecutive price of soybean substitutes, and soybean harvest area.

The correlation matrix shows that the monthly continuous price of soybean, the closing price of soybean meal index and the closing price of soybean oil index are all correlated with soybean futures price, and the correlation coefficient is more than 85%.

6. Research Conclusions and Policy Recommendations

6.1 Research Conclusions

With the gradual opening of China's financial market, the influence of the soybean futures market on the international stage has also been rising, further strengthening the connection and exchange between domestic and international financial markets. Currently, soybean futures have become a major global mechanism for agricultural price formation and exert a significant impact on worldwide grain trade. The soybean futures market plays a crucial role in China's financial industry, driving the diversification of financial markets and enhancing the efficiency and stability of market operations. The introduction of soybean futures has a certain guiding effect on price fluctuations of agricultural products in China and has a major impact on the domestic grain market. Therefore, the study of factors influencing soybean futures prices has become increasingly important. Through analysis, this paper draws the following conclusions:

First, through the study of the current research situation at home and abroad, it is concluded that the research on the factors affecting soybean futures prices at this stage mainly focuses on two aspects: one is to study the impact of futures market factors on the soybean futures market, and the other is to study the impact of spot market factors on the soybean futures market. This paper conducts research from both futures and spot markets, providing a more comprehensive analysis of the influencing factors.

Second, this study identifies key factors influencing soybean futures prices, including the US dollar index closing rate, the RMB exchange rate, the Loan Prime Rate (LPR), China's soybean production, consumption volume, export volume, import volume, production costs, the current month's consecutive price of substitutes, and soybean harvest area. The findings indicate that soybean futures prices rise when the current month's consecutive price of soybeans, the closing price of the soybean meal index, and the closing price of the soybean oil index show an upward trend. To ensure the stability of soybean futures prices, it is essential to conduct in-depth analysis of these factors' fluctuations.

Thirdly, in order to stabilize the price of soybean futures, we should pay attention to the closing price of soybean index, soybean oil index and soybean meal index. When analyzing the future trend of soybean futures price, we should also analyze these factors. When these factors are rising, the trend of soybean futures price will also be rising.

Fourthly, in order to predict the change of soybean futures price, the paper gives some suggestions, including: pay attention to the change of soybean downstream market, make reasonable subsidy policy and soybean import and export policy, and improve the supervision system of soybean market. Through the above measures, the soybean futures market can be more stable and the forecast of soybean futures price can be more accurate.

The research on the factors affecting the price of soybean futures is of great significance to predict the fluctuation of soybean futures price and prevent the economic risk caused by the excessive fluctuation of futures price. It promotes the development of futures market and makes the futures market more stable.

6.2 Policy Recommendations

6.2.1 Pay Attention to the Changes in the Downstream Market of Soybean

The downstream sectors of soybeans encompass edible oil, feed, and biofuels, where price fluctuations influence soybean futures through supply-demand dynamics and cost linkages. In the feed sector, surging livestock breeding demand drives up animal feed prices, which in turn increases soybean meal procurement and boosts crushing demand, exerting upward pressure on futures prices. For edible oil, rising soybean oil prices may trigger substitution consumption, suppressing soybean demand and depressing futures prices. Conversely, higher biofuel prices could expand industrial soybean demand, propelling futures prices higher. Additionally, changes in international market demand, government industrial policies, and market expectations indirectly affect soybean futures prices, influencing trading behavior in the futures market.

6.2.2 Pay Attention to the Closing Price of the Soybean Oil Index

Empirical evidence demonstrates a significant positive correlation between soybean oil index closing prices and soybean futures prices. Fluctuations in soybean oil prices influence soybean procurement volumes through end-user demand, while simultaneously affecting processors' profit expectations, thereby regulating procurement scales. Market expectations for soybean oil prices directly guide futures market trading activities, and international soybean oil price volatility is transmitted to domestic futures markets via import cost adjustments.

6.2.3 Pay Attention to the Closing Price of the Soybean Meal Index

As a core feed ingredient, soybean meal's closing price directly reflects supply-demand dynamics that influence soybean futures pricing. When strong demand or supply shortages drive up prices, this pressure often compels soybean crushing capacity expansion, which in turn increases overall demand and pushes futures prices higher. Investors' expectations about soybean meal prices significantly impact soybean futures trading, while price fluctuations also indirectly affect soybean demand through feed ingredient mix adjustments.

6.2.4 Formulate Reasonable Soybean Subsidy and Import-export Policies

Subsidies and import/export policies serve as key instruments for balancing market supply and demand and stabilizing soybean futures prices. Fiscal subsidies for growers and minimum purchase price policies can boost planting enthusiasm, stabilize soybean production, and mitigate price volatility. Regarding import policies, adjustments to tariffs and quotas directly regulate domestic supply. Tariff increases or import restrictions tend to drive up futures prices, while reductions exert downward pressure. Import policies also influence corporate procurement expectations, providing either support or restraint to futures prices.

6.2.5 Improving the Soybean Market Supervision System

A sound regulatory system can standardize market behavior, enhance transparency, reduce risks, and stabilize spot and futures prices of soybeans. Regulation ensures the fairness and rationality of the price formation mechanism, strengthens the price discovery function, controls product quality and safety, maintains market order and sustainable development of the industrial chain, and promotes agricultural modernization.

The financialization of agricultural products promotes the development of futures market, but it is necessary to pay attention to multiple influencing factors. In addition to the quantified analysis of exchange rate, output and other factors, the supply chain stability, diversified procurement, the use of financial instruments, the layout of international market and other fundamental factors should also be included in the supervision, so as to comprehensively prevent market risks.

Enhancing spot market governance can stabilize futures prices through multiple channels: disclosing core data like production and inventory to reduce volatility caused by information asymmetry; cracking down on market manipulation and other irregularities to uphold fair competition; refining risk management tools to help market participants hedge against price risks; and boosting market liquidity and confidence to ensure stable futures price movements.

References

Chen Fanghao. (2016). Analysis of the Vector Autoregression Model of the Factors Affecting the Fluctuation of Soybean Futures Price. *Agricultural Economics*, 2016(02), 129-131.

Chen Haodong, & Sun Yongqing. (2020). Analysis of the Volatility Characteristics of Soybean Futures Prices: An Empirical Study Based on the Beta-skew-t-EGARCH Model. *Market Forum*, 2020(05), 62-65.

Dragan, M., & Cole, G. (2023). Futures markets and price stabilisation: An analysis of soybeans markets in North America. *Australian Journal of Agricultural and Resource Economics*, 67(1), 104-117. https://doi.org/10.1111/1467-8489.12504

Guo Qianqian, Wang Xinghui, & Zhang Congqiao. (2022). Prediction of soybean futures prices in China based on multi-frequency optimization combination model. *Journal of Yanbian University* (Natural Science Edition), *48*(04), 347-353. https://doi.org/10.16379/j.cnki.issn.1004-4353.2022.04.017

Izaan, J., Mori, K., Sang, T. L., Izaan, J., Mori, K., Sang, T. L., et al. (2022). The Impact of Soybean Futures and Crude Oil Futures on Palm Oil Indexes: Evidence from Bounds Test of Level Relationship and Causality Analysis. *Economies*, *10*(10), 237-237. https://doi.org/10.3390/economies10100237

Li Xinyue. (2022). Research on the Spillover Effect of Volatility of Soybean Futures under External Shock in China: An Analysis Based on the ACARR-X Model. *Price Theory and Practice*, *2022*(09), 138-141+206. https://doi.org/10.19851/j.cnki.cn11-1010/f.2022.09.387

Liu Chao, Du Jiarong, & Mao Wenqian. (2022). China soybean futures price volatility characteristics: ARCH model research based on the perspective of Sino-US trade friction. *Journal of Hebei Agricultural University* (Social Sciences Edition), *24*(03), 120-128. https://doi.org/10.13320/j.cnki.jauhe.2022.0042

Liu Kai, & Mu Yueying. (2017). Analysis of price fluctuations and linkage in Sino-US soybean futures markets. *China Agricultural Science Bulletin*, *33*(33), 159-164.

Liu Lijun, & Zhao Lisan. (2017). The Price Relationship between Soybean Futures and Soybean Oil Futures-Based on the Experience Analysis of Dalian Commodity Exchange. *Journal of Hebei University* (Philosophy and Social Sciences Edition), *42*(02), 103-109.

Schneid, M. T., Enrique, C. G. C., & Vasconcelos, A. L. (2022). Determinants of Corn and Soybean Futures Prices Traded on the Brazilian Stock Exchange: An ARDL Approach. *International Journal of Economics and Finance*, *15*(1), 65-. https://doi.org/10.5539/ijef.v15n1p65

Sun Yi, & Qin Meng. (2018). Research on the linkage between international soybean futures and domestic soybean futures prices. *Price Theory and Practice*, *2018*(12), 123-126. https://doi.org/10.19851/j.cnki.cn11-1010/f.2018.12.028

Teng Yongping, & Zhou Tingting. (2017). Empirical Research on Soybean Futures Price Prediction. *Journal of Shenyang University of Technology* (Social Sciences Edition), *10*(04), 331-33.

Xiong Tao, & Bao Yukun. (2020). Research on the Prediction of Soybean Futures Price Based on Dynamic Model Averaging. *China Management Science*, *28*(05), 79-88. https://doi.org/10.16381/j.cnki.issn1003-207x.2020.05.008

Yin Lan. (2023). Empirical Analysis of Multi-Factor Influencing Agricultural Futures Price Fluctuation: A Case Study of Soybean Futures. *Heilongjiang Grain*, *2023*(09), 143-147.

Yuan Mingjuan, & Sun Ruoying. (2021). Research on Price Prediction of Bulk Agricultural Products Based on LSTM Neural Network. *Strait Science and Technology*, *34*(11), 43-47+60.