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Research on the Trading Strategy of Commodity Futures

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Abstract: Based on the data of rubber and thread steel, in this paper, we studied the commodity futures market. By MATLAB, the data of rubber was analysed, and the opening price, closing price, highest price and so on in different periods was calculated. And then according to these data, the sequence diagram of the price and other indicators of change over time was drawn by EXCEL. Three models of price prediction, i.e., variable coefficient regression model, BP neural network model, time series model, are presented. And the forecasts of the three models being compared, the forecasts are in good agreement with the actualities. Finally, the price of thread steel was forecasted by the moving average method, and the transaction of thread steel in a period of time was simulated under some simple trading rules.

Keywords: Variable coefficient regression model; BP neural network model; Time series model; Moving average method

1. Introduction

The futures market first sprouted in Europe. In ancient Greece and Rome, there were many exchanges and trading activities with the nature of futures trade. Founded in 1848, Chicago was the first futures exchange with modern significance. The futures exchange established the standard contract model in 1865. In the 1990s, China's first modern futures exchange was born. Now our country has Dalian Commodity Exchange, Shanghai Futures Exchange, China Financial Futures Exchange and Zhengzhou Commodity Exchange. The price changes of the futures listed on the stock exchange have had a far-reaching impact on the relevant industries at home and abroad. So far, the domestic futures market is not yet fully mature, but the relevant system is relatively perfect, and more and more businessmen invest in futures.

Procedural trading is the realization of TRADERS'trading ideas and trading models through computer readable language. According to the trading model and trading rules, the computer analyses market data, calculates data indicators and sends out trading signals. The computer automatically executes trading and completes portfolio trading. Procedural trading is not a trading method that takes performance and interests as the first, but pursues long-term and steady profits. After long-term operation, it achieves the compound effect of wealth accumulation, especially in the futures market where the scale of capital is expanding, risk is increasing and volatility is frequent. Procedural trading is more favored by investors than other trading methods [1].

This paper intends to analyze the past futures trading data, and forecast the unknown data in the future. Combined with the analysis results, the optimal profit model is obtained, and the model is tested. The advantages and disadvantages of the model are analyzed, so as to maximize profits.

2. Data Processing

Firstly, we use MATLAB software to process the RU1301 data of September 3, 4 and 5, 2012. The data of different periods are processed. The specific results are shown in tables 1to 5. The table lists the highest price, the lowest price, the opening price, the closing price, the average price and the weighted average price in different periods. See Appendix 1 for the source code. Data preprocessing.

Table 1. Data for 15 seconds

N (Cycle)	Opening Price	Closing Price	Maximum Price	Minimum Price	Average Price	Weighted Average Price
1	21570	21525	21585	21515	21541	21553
2	21530	21530	21545	21520	21536	21536
3	21530	21545	21550	21530	21541	21541
4	21540	21540	21545	21535	21541	21541
5	21540	21540	21580	21540	21555	21555
...						

Table 2. Data with 1 minute cycle

N (Cycle)	Opening Price	Closing Price	Maximum	Minimum Price	Average Price	Weighted Av-

			Price			erage Price
1	21570	21540	21585	21515	21540	21546
2	21540	21645	21660	21540	21607	21612
3	21645	21625	21650	21615	21633	21635
4	21625	21650	21660	21620	21640	21644
5	21645	21660	21680	21635	21664	21665
…						

Table 3. Data for 5 minutes

N (Cycle)	Opening Price	Closing Price	Maximum Price	Minimum Price	Average Price	Weighted Average Price
1	21570	21660	21680	21515	21617	21609
2	21665	21765	21770	21650	21722	21728
3	21765	21685	21780	21675	21715	21719
4	21690	21675	21705	21660	21686	21682
5	21670	21690	21730	21670	21695	21698
…						

Table 4. Data for 15 minutes

N (Cycle)	Opening Price	Closing Price	Maximum Price	Minimum Price	Average Price	Weighted Average Price
1	21570	21685	21780	21515	21685	21673
2	21690	21720	21740	21660	21699	21698
3	21715	21730	21760	21695	21720	21723
4	21735	21835	21915	21725	21830	21836
5	21835	21875	21930	21805	21853	21863
…						

Table 5. Data for a hour period

N (Cycle)	Opening Price	Closing Price	Maximum Price	Minimum Price	Average Price	Weighted Average Price
1	21570	21835	21915	21515	21733	21730
2	21835	22125	22190	21805	21965	21990
3	22130	22160	22340	22095	22163	22176
4	22165	21850	22215	21765	21915	21925
5	21850	21810	21975	21730	21861	21862
…						

From the above table, it is difficult to see the relationship between the data intuitively. Taking data with a period of 15 minutes as samples, we use EXCEL to make stock price figure 1 in order of volume, opening price, maximum price, minimum price and closing price.

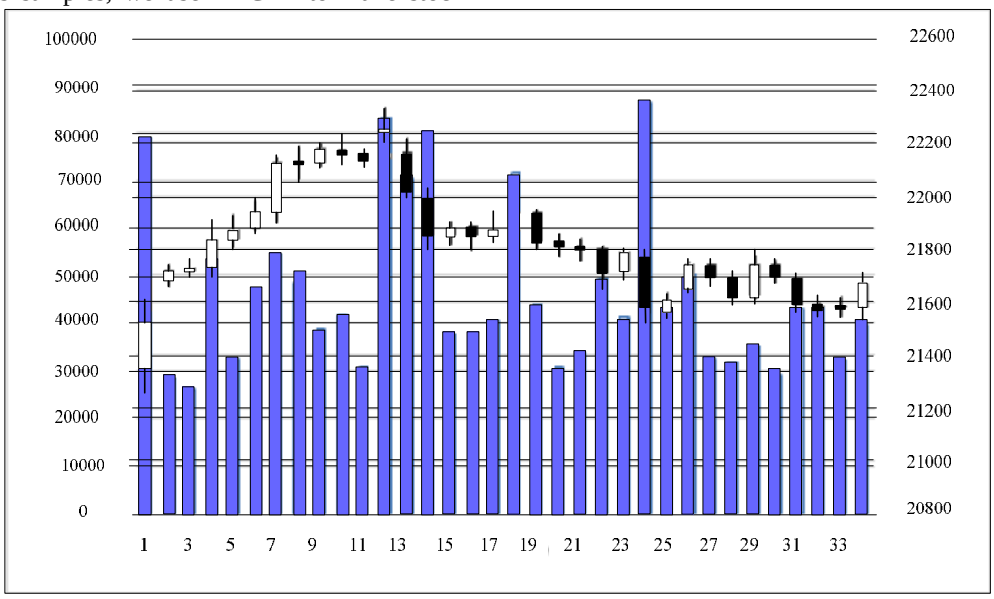

Figure 1. Volume and price charts for 15 min cycle

From Figure 1, we can see that the transaction price increases significantly with the change of time, and the prices generated by the transaction price are very intuitive.

3. Price Forecast-Time Series Model

The moving average is based on Dow Jones' concept of average cost. It draws the average value of futures price in a certain period by software, observes the fluctuation of futures price through curve, and reflects the future development trend of futures price.

Secondary moving average is applied to the data, and linear trend prediction model is established by using the law of moving average lag deviation. This is the trend moving average method. On the basis of one moving average, the second moving average is the second moving average, and its formula is as follows:

$$M_t^{(2)} = \frac{1}{N}(M_t^{(1)} + \mathbf{L} + M_{t-N+1}^{(1)}) = M_{t-1}^{(2)} + \frac{1}{N}(M_t^{(1)} - M_{t-N}^{(1)}) \quad (1)$$

First, we assume that the time series has a linear trend from a certain period of time, and think that future data will change according to this law. We set this linear trend prediction model.

$$y_{t+m} = a_t + b_t m,\ m = 1,2,\mathbf{L} \quad (2)$$

Among them are the current period; the period from the beginning to the forecast period; the intercept; the slope. They are also called smoothing coefficients. The smoothing coefficient in the model (2) is determined according to the moving average value.

$$\begin{aligned} y_{t-1} &= y_t - b_t \\ y_{t-2} &= y_t - 2b_t \\ &\mathbb{M} \\ y_{t-N+1} &= y_t - (N-1)b_t \end{aligned} \quad (3)$$

So

$$\begin{aligned} M_t^{(1)} &= \frac{y_t + y_{t-1} + \mathbf{L} + y_{t-N+1}}{N} = \frac{y_t + (y_t - b_t) + \mathbf{L} + [y_t - (N-1)b_t]}{N} \\ &= \frac{Ny_t - [1+2+\mathbf{L} + (N-1)]b_t}{N} = y_t - \frac{N-1}{2}b_t \end{aligned} \quad (4)$$

Therefore

$$y_t - M_t^{(1)} = \frac{N-1}{2}b_t \quad (5)$$

Derivation from Formula(2) and Similar Formula (5) is obtained.

$$y_{t-1} - M_{t-1}^{(1)} = \frac{N-1}{2}b_t \quad (6)$$

So

$$y_t - y_{t-1} = M_t^{(1)} - M_{t-1}^{(1)} = b_t \quad (7)$$

Derivation of analogy formula(5) is available.

$$M_t^{(1)} - M_t^{(2)} = \frac{N-1}{2}b_t \quad (8)$$

From the sum of formula (5)and formula (8), the formula for calculating smoothing coefficient is obtained as follows.

$$\begin{aligned} a_t &= 2M_t^{(1)} - M_t^{(2)} \\ b_t &= \frac{2}{N-1}(M_t^{(1)} - M_t^{(2)}) \end{aligned} \quad (9)$$

The data of RU1301 on September 3, 4 and 5 are selected for data analysis. According to the above algorithm, the first 100 data are selected for experiment and compared with 101 and 102 data. The experimental results are shown in Figure 2.

Figure 3 above is the result of the prediction of RU1301 data on September 3 by a neural network model. The comparison of the output results shows that it is basically accurate.

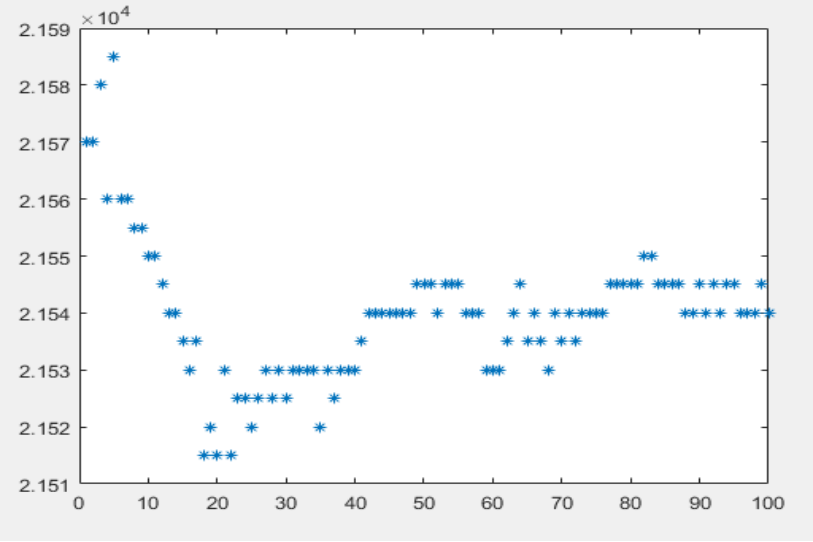

Figure 2. Predictive chart of transaction price using moving average

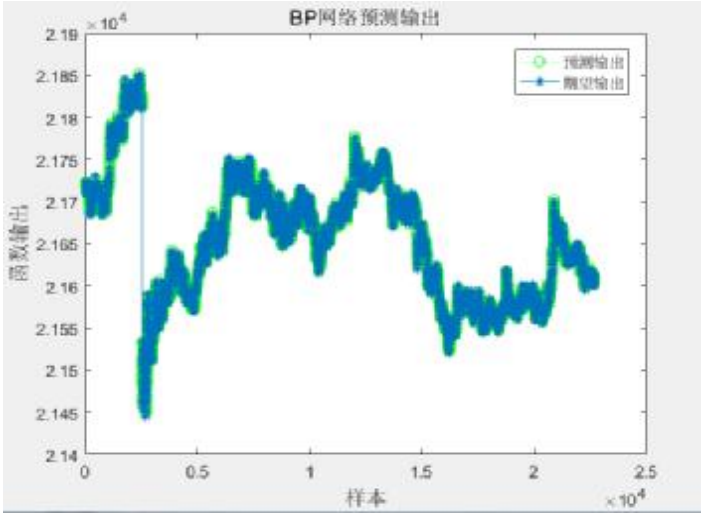

Figure 3. BP neural network prediction diagram

4. Research on Procedural Control of Futures Trading

This paper uses the theory of moving average to analyze the fluctuation of futures trading price, then studies the relevant information of trading returns, and establishes a trend tracking model.

4.1. Rules for automatic transactions

Firstly, we process and analyze the data of the threaded futures trading in July 2016. We use the moving average to predict whether to buy or sell, as follows:

Current Transaction Price - Current Average Price >= 2 mail = 1 Recommended Buy

Current Transaction Price - Current Average Price <=-2 mail=-1 Suggested Selling

Current Transaction Price - Current Average Price = [2,-2] mail = 0 Continue to Hold

Short-term mean-long-term mean >= 1 mail = 2 golden intersection

Short-term mean-long-term mean <=-1.5 mail=-2 death intersection

4.2. Simulation experiment of futures automatic trading

Taking RB1609 data of threaded steel for a period of time and taking 15s and 1 minute as the period, the known data are analyzed, and the model in Section 3 is used to predict and trade according to some rules, so as to achieve the best profit of all-day trading.

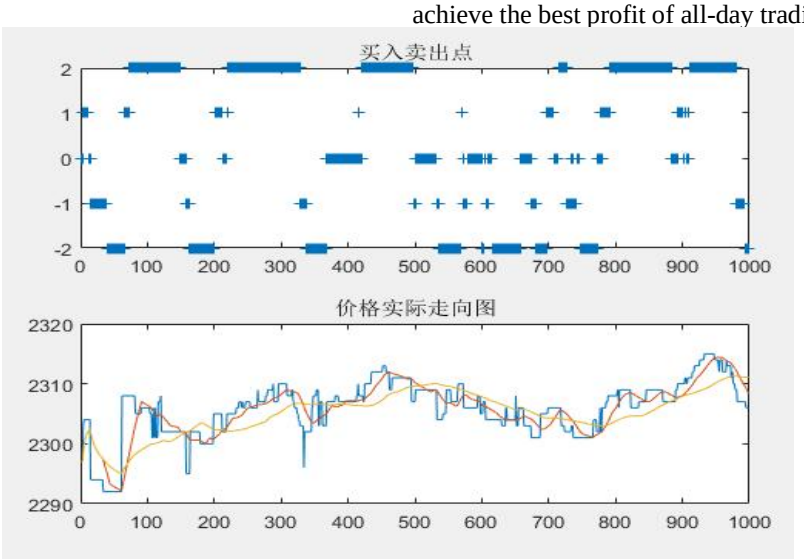

Figure 4. Futures automated trading chart

The final output is 8.3231e+05. The trend of price can be clearly seen from the figure, which has an intuitive manifestation of future buying or selling.

5. Summary

Firstly, this paper realizes the programmed analysis and processing of the relevant data of futures trading, and gives the fluctuation trend of its price, as well as the change trend chart of the transaction price and volume, which can intuitively analyze and summarize the future price trend. Secondly, we adopt the trend moving average method, which only considers the price factor, but does not consider the influence of its relevant variables on the price. We can reduce the errors caused by various factors by designing the program more complex. Finally, we formulated a simple automatic trading rule and realized the procedural process.

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