Research on Prediction of Photovoltaic Building Integrated Plate Index Based on Mobile Average Model

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Abstract: In order to predict the future development trend of photovoltaic building integration plate, this paper studies the index of photovoltaic building integration plate. Firstly, the weight factors of 37 enterprises are calculated by using the total turnover, and then the corresponding sector indices are calculated by using the closing price and the average turnover price respectively. Secondly, the 5-day, 10-day and 20-day moving average models of the plate are obtained by using the obtained plate index. Finally, by comparison, the average transaction price with an average error of only 1.52% is set as the plate index of this plate, and a plate index calculation model based on the moving average model is proposed, in order to provide reference for relevant personnel.

Keywords: plate index, weight factor, moving average.

1. Introduction

In the stock trading software, each stock has a daily K line and a moving average. By studying and forecasting the daily K line and the moving average, we can analyze the trend of each stock. The correlation coefficients of individual stocks in the same plate are generated according to different weighting methods, which can be regarded as a whole plate and can represent the overall reflection of the trend of the plate. The photovoltaic building integration [1] plate is a new plate, and by forecasting the development trend of the plate index, we can know the future development trend of the corresponding industries in the plate. [2]

2. Plate index calculation model based on moving average model.

Using the price of securities, the index model of photovoltaic building integrated stock is established. Firstly, the daily plate index is calculated separately. Taking April 1, 2019 as the first day, and taking the average price of 37 securities as the sector index of i-th day, the sector index of i-th day is:

$$sector\ index\ of\ i-th\ day\ x_i = \frac{\sum_{j=1}^{37} The\ price\ of\ each\ company\ i-th\ day}{37}$$

Because the turnover of each securities is different, and its share in the total market value of the sector is also different, the influence of the change of different securities prices on the sector index is also different. The weight factor α is introduced to analyze the influence of different securities on the sector index.

After analyzing the turnover of each securities company after April 2019 and the total turnover of 37 companies, the weighting factor of the j-th company is:

$$\alpha_j = \frac{j-th\ Securities\ The\ total\ turnover\ after\ April\ 2019}{All\ 37\ total\ turnover\ after\ April\ 2019}$$

Use MATLAB to calculate the weight coefficients of 37 securities companies, as shown in Table 1:

Table 1: Weight Factor Table of 37 Securities Companies.

Nanbo a	Shenzhen Energy	Dongxu blue sky	Fangda group	Shensaige	Baoying stock	Southeast net rack	Yanhua intelligent
0.027342	0.037716	0.017999	0.005536	0.020149	0.010021	0.011203	0.008605
Tuo ri Xin neng	Zhongli group	Yasha stock	Guangtian group	Rui stock	Yamadun	Yonggao stock	Zhongzhuang construction
0.014505	0.007274	0.011404	0.004726	0.003389	0.017325	0.009289	0.018673
Nanwang energy	Teruide	Jiayu stock	Orient risheng	Xiu Qiang stock	Haida stock	Rotational pole information	Zhong stock
--	0.054298	0.008800	0.066697	0.030000	0.010433	0.034926	0.022246
Huazi technology	Qidi design	Hanjia design	Precision work steel structure	Sumeida	Longji stock	Jeni energy	Mingyang intelligent
0.009788	0.003687	0.005750	0.020917	0.016564	0.380453	0.022166	0.048369
Jianghe group	Zhongheng design	Sente stock	Xinneng technology	Qingyuan stock			
0.007185	0.003855	0.008045	0.017272	0.003389			

Among them, the listing time of "Nanwang Energy" securities is after 2021, and the turnover before this time is 0, so it is not included in the calculation of weight factor.

After calculating the weight factor, the method of solving the stock price is analyzed. Here, the daily closing price and the average transaction price are used to express the securities price. The daily closing price is the closing price of securities, and the average transaction price is calculated as follows:

$$average\ transaction\ price = \frac{Daily\ turnover}{Daily\ transaction\ volume}$$

The securities price can be expressed by the closing price or the average transaction price.

The moving average is a curve drawn according to the moving average. Let the plate indices be $x_1, x_2, x_3 \ldots x_n$, and the calculation method of moving average is as follows: [3].

If the number of items in the moving average is odd, then the moving average of the number is the average of the sum of the left and right symmetrical values. For example, when seeking the moving average of 5 days, starting from the third day, the daily moving average is the average of the plate index of this day, the first two days and the last two days, and so on, as shown in Figure 1.t
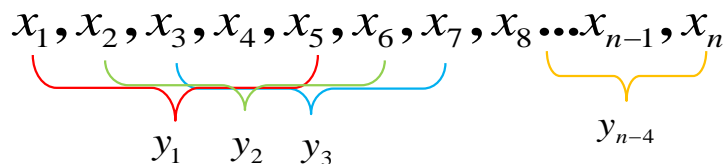
$$x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8 \ldots x_{n-1}, x_n$$

$$y_1 \quad y_2 \quad y_3 \qquad\qquad y_{n-4}$$

Figure 1: Calculation Method of Moving Average of Odd Items.

The 5-day moving average is calculated as follows:

$$y_1 = \frac{x_1 + \cdots + x_5}{5}, y_2 = \frac{x_2 + \cdots + x_6}{5}, y_3 = \frac{x_3 + \cdots + x_7}{5}, \cdots$$

If the number of items in the moving average is even, the calculation method is to take two averages. First, find out the number adjacent to the t-th number. Since it cannot be taken out symmetrically, take it twice, and then find the average of the two results. For example, when taking the moving average of 4 days, first take out the average a_1 of two numbers on the left and one number on the right of this day, and then find the symmetry a_2, then the average is the y_1.

$$x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8 \ldots x_{n-1}, x_n$$

$$a_1 \quad a_2 \quad a_3 \qquad\qquad a_{n-4} \quad a_{n-3}$$

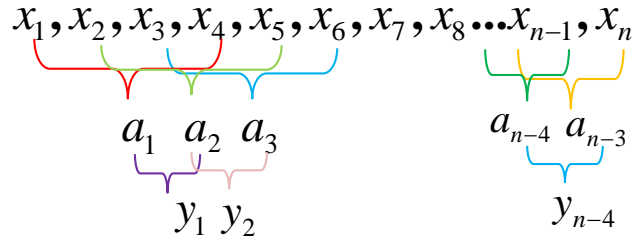$$y_1 \quad y_2 \qquad\qquad\qquad y_{n-4}$$

Figure 2: Calculation method of moving average of even terms.

The 5-day moving average is calculated as follows:

$$a_1 = \frac{x_1 + \cdots + x_4}{4}, a_2 = \frac{x_2 + \cdots + x_5}{4}, a_3 = \frac{x_3 + \cdots + x_6}{4}, \cdots$$

$$y_1 = \frac{a_1 + a_2}{2}, y_2 = \frac{a_2 + a_3}{2}, y_3 = \frac{a_3 + a_4}{2}, \cdots$$

3. Model solving.

3.1. The plate index model established by closing price.

MATLAB was used to calculate the photovoltaic building integration plate index based on closing price from April 1, 2019 to April 30, 2021, and the moving averages of 5, 10 and 20 days were calculated. Among them, since the 5-day moving average appears from the 3rd day, the 10-day moving average appears from the 5th day and the 20-day moving average appears from the 10th day, there is no moving average in the starting time. If there is no moving average, consider the plate index of the current day as a moving average; if there is a 5-day moving average but not a 20-day moving average, use the 5-day moving average as the value of the 20-day moving average, complete the table, and draw the moving average (5th, 10th, 20th) of the plate index model based on the closing price and the scatter diagram of the plate index as shown in Figure 3.
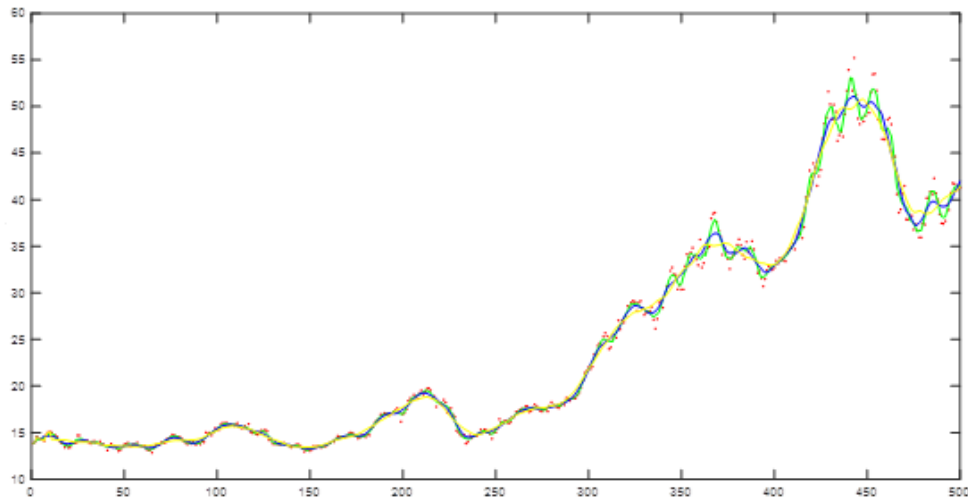

Figure 3: Plate index and moving averages based on closing price.

3.2. Plate index model established by average transaction price.

MATLAB was used to calculate the photovoltaic building integration plate index based on the average transaction price from April 1, 2019 to April 30, 2021, and the moving averages of 5 days, 10 days and 20 days were calculated. At the same time, the moving average (5th, 10th and 20th) of the plate index model established according to the average transaction price and the scatter diagram of the plate index are drawn as shown in Figure 4.
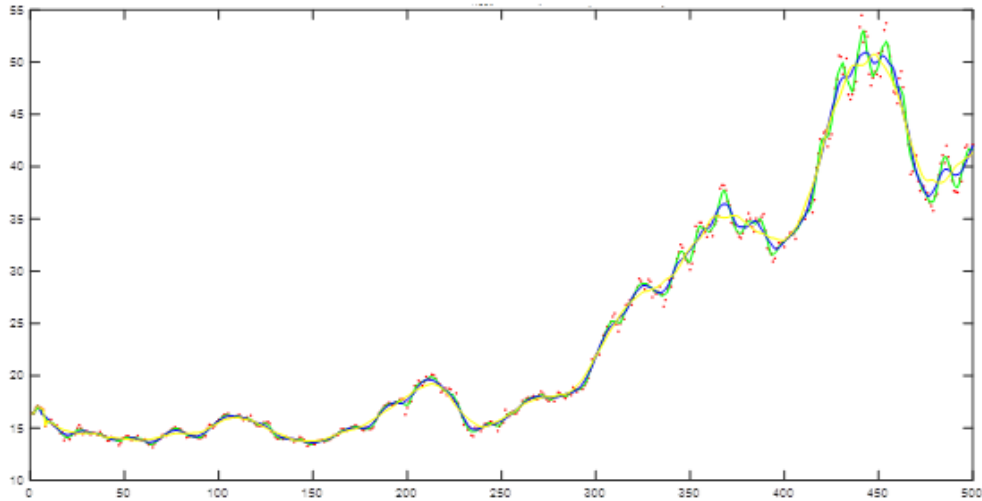
Figure 4: Plate index and moving averages based on average transaction price.

4. Conclusion

Firstly, this paper establishes the index calculation model of photovoltaic building integrated stock, and sets the plate index as the average price of 37 companies on that day. Because the total turnover of different securities is not the same, which has different influence on the sector index, so it has different weights in the stock sector. We introduce the weight factor to analyze the weight of each company, and the solution method of the weight factor is the ratio of the total turnover of each stock company after April 2019 to the turnover of all companies after April 2019. In this paper, the closing price and average transaction price of securities are used to calculate the plate index, and the moving average line of the plate index is drawn. It is found that although the fluctuation of the plate index is obvious, it can be seen from the images that the plate index drawn in either way is on the rise as a whole, which shows that the development prospect of the photovoltaic building integration plate index is better in the short term.

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