Constructing Trading Strategies According to Fibonacci Sequence in Shanghai Stock Market

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Abstract—**The goal of this paper is to investigate the performance of Fibonacci sequence investment strategies in Shanghai stock market. The Fibonacci numbers are the numbers following the integer sequence, which is referred to as the Fibonacci sequence, and characterized by the fact that every number is the sum of two numbers preceding it. We construct buy and hold portfolios based on holding periods and market conditions. The results suggest Fibonacci's strategy still has excess return in a short-run, but there is no strong evidence that investment performance outperforms the market in a long-run. We suggest that the Fibonacci strategy can be regarded as a trading strategy, depending on the level of risk-taking for a holding portfolio.**

Keywords—*Fibonacci sequence; Trading strategy; Shanghai Stock Market; Risk-taking*

I. INTRODUCTION

The application of Fibonacci sequence is commonly used in selecting investment strategies in financial markets, which is the most interesting and innovative point of this article. Chen et al. (2007) proposed a new model that incorporates the concept of the Fibonacci sequence for promoting the stock price forecasting of fuzzy time-series models [4]. Fibonacci indicator algorithm can predict possible local maximum and minimum prices, and periods in which the price of a stock will experience a significant amount of movement (Ghanbarzadeh, 2018) [6].

We observe that stocks with greater sensitivities to equity return dispersion yield higher average returns (Riza Demirer et al. 2015) [3]. Goldberg et al. (2013) introduced the Risk Diversification Index (RDI) for capital concentrations to analyze risk diversification benefits in a consistent way [8]. However, statistically significant return premium does not guarantee outperformance over reasonable investment horizons by gauging the return-generating potential of four investment strategies (Anderson et al., 2012) [1]. In recent years, China's financial and Investment system continues to develop towards internationalization, which increases the uncertainty of risk in financial market. Therefore, the paper aims to investigate the performance of the Fibonacci sequence investment strategies in Shanghai stock market and discuss whether these strategies can avoid risks and gain profit.

In general, there are many ways to invest in the stock market in terms of fundamental analysis. Low price-earnings ratio stocks can get excess returns, while stocks with high price-earnings ratio are not (Basu, 1983) [2]. Shen and Tzeng (2015) propose a combined soft computing model for tackling the value stock selection problem [10]. In addition, technical analysis is another way when investing. For example, according to Tanaka-Yamawak and Tokuoka (2007), the optimal combination provides us a good forecast on the level of the future price at several ticks ahead [11]. Hoffmann and Shefrin (2014) pointed out that investors using technical analysis experience greater turnover and lower returns [7]. We proposed a stock trading system for creating buy-sell points using genetic algorithms (Sezer et al., 2017) [9].

The paper is organized as follow: Section 2 focuses on a review of previous evidence. Section 3explains the method and application of Fibonacci Sequence in stock market. Section 4 concludes a discussion of the implication.

II. LITERATURE REVIEW

A. Application of Fibonacci sequence

Fibonacci numbers are inextricably linked to some phenomena in our lives like the growth patterns of some organisms, seed development and the dart lines. The sequence is also applied into modern physics, Quasicrystal structure, chemistry and so on. For example, Chen et al. (2007) proposed a new model that incorporates the concept of the Fibonacci sequence for promoting the stock price forecasting of fuzzy time-series models [4]. Fibonacci indicator algorithm put forward by Ghanbarzadeh (2018) is used to predict possible local maximum and minimum prices, and periods in which the price of a stock will experience a significant amount of movement [6].

B. Analysis method of investment in stock market

In stock market, fundamental analysis and technical analysis are often used to select investment strategies for investing. For rational expectations, most investors make decisions are based on quantitative analysis of the company's financial information and qualitative analysis of its business, competition and economic environment. Benjamin Graham and Philip Fisher as the first generation leaders of value investment,

they put forward the static value investment strategy and the dynamic value investment strategy respectively. Graham suggested it is good time to buy stocks when there is great difference between intrinsic value and stock price. Fisher selected stocks by studying company's operation and the management level of the company. Basu (1983) draws the conclusion by using CAPM model that the stocks with low price-earnings ratio can get excess return, while stocks with high price-earnings ratio can not [2].

In general, technical analysis is used to studies on predicting price changes and looking for investment strategies. "Elliott Wave Principle" can predict when the trend will end once the trend is established (Elliott, 1939). For example, according to Tanaka-Yamawak and Tokuoka (2007), the optimal combination by using evolutional computation provides us a good forecast on the level of the future price at several ticks ahead [11]. Investors using technical analysis experience greater turnover and lower returns (Hoffmann and Shefrin, 2015) [7]. Sezer et al. (2017) proposed a stock trading system based on optimized technical analysis parameters for creating buy-sell points using genetic algorithms [9].

III. RESEARCH METHODS

A. Related theories of Fibonacci sequence

1) Outline of Fibonacci sequence

Fibonacci sequence, also known as the Golden Segment, is introduced by mathematician Leonardo Fibonacci as an example of rabbit breeding. So it's also called the rabbit number series, and it means such a sequence of numbers: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597, 2584......., mathematically, the Fibonacci sequence is defined as follows:

$$F(0) = 1, F(1) = 1,$$

$$F(n) = F(n-1) + F(n-2)(n \geq 2, n \in N^*),$$

its general term formula can be expressed as follows:

$$F(n) = \frac{1}{\sqrt{5}}\left[\left(\frac{1+\sqrt{5}}{2}\right)^n - \left(\frac{1-\sqrt{5}}{2}\right)^n\right]$$

Item 0 of its sequence is 0, each term is equal to the sum of the first two terms, when n tends to infinity, the ratio of the former term to the latter term is more and more close to 0.618, which is regarded as golden section. It is a natural number sequence that can be expressed by the general term formula of irrational numbers.

2) The Application of Fibonacci number Series in Stock Market

a) Time period

The method uses 1, 2, 3, 5, 8, 13, 21, 34, 55, 89......, as the possible time point for a turning point in the stock market. Special attention should be paid to the 21, 55, 89 days, especially 55 days, as that number is likely to be the critical point in which share prices end up. In application, we start with the lowest or highest point of the most recent stage of a particular stock or market, and find the corresponding days.

b) Price channel line

This method can be used to figure out the trend of the stock price channel for a certain period of time. In this way, we can draw the trend of stock price in a certain period of time. The first step is to find the K-line of the 60-day moving average. Take this K-line as the first day to place the Fibonacci sequence line. Then start with the closing price of line K on the first day of the Fibonacci line and draw the price passage line at the end of the 34th day, and take the position of the lowest lower lead line between 1-34 days as the width to form the price channel. As long as the stock price is not effective to fall below the track of the channel can always be repeated operation, band profit.

c) Judging the rise and fall of the bottom

Change the numbers in the Fibonacci sequence to 10%、20%、30%、50%、80%、130%、210%...... First, find the top price and the lowest price at the bottom and add them. Then the average price is the reference price of the bottom market. Similarly, the average price at the top can be roughly calculated. Finally, the resistance level or supporting position can be obtained by multiplying 20%、30%、50%, etc.

B. Explore the investment portfolio in a period of time.

On the basis of the time cycle, we use the data from 2008 to 2015 to explore the short-term investment to discuss whether we can get profits after buying for fallen 3 days or losing 5 days in a row.

TABLE I.   RETURN RATE FOR EACH DAY AFTER FALLING FOR THREE DAYS IN A ROW

Holding days	Profit (times)	No profit (times)	Profit in falling market	Profit in rising market
1	55	54	0.471	0.718
2	60	49	0.500	0.821
3	53	56	0.386	0.795
4	53	56	0.371	0.846
5	52	57	0.371	0.821
6	57	52	0.429	0.795
7	58	51	0.400	0.897

Table one is to assume that in the case of three consecutive days falling as a buy signal, if there are three days to fall, they will buy as the premise, and calculate the rate of return for one to seven days respectively. The results show that the probability of making profit is roughly half. The probability of profit in a rising market is between 70% and 90%, while that

in a sharp market is about 35% to 50%. If combines the market trend to analysis, the profitability is still good.

TABLE II.   RETURN RATE FOR EACH DAY AFTER FALLING FOR FIVE DAYS IN A ROW

holding days	Profit (times)	No profit (times)	Profit in falling market	Profit in rising market
1	12	12	0.421	0.8
2	10	14	0.316	0.8
3	11	13	0.368	0.8
4	12	11	0.421	0.8
5	12	11	0.421	0.8
6	10	13	0.263	1
7	11	12	0.316	1

Table two is based on the assumption that a buy signal for falling of 5 days in a row. If there are 5 days of fall, buying as a premise and then calculating the yield rate of 1 to 7 days respectively. The results show that the probability of making profit is roughly half, and the probability of being able to profit in the rising market is probably in 80%-100%, the probability of being able to profit in a big drop in the market is probably at 25%-45%. In combination with the trend of market, the probability of profit is also better.

IV.   RESEARCH CONCLUSION

In this paper, we use Fibonacci sequence in Shanghai Stock Exchange Index of A share market to analyze the K-line chart the data. For the SSE (Shanghai Stock Exchange) Composite Index, this paper randomly selects a K-line chart in the method introduction, we choose the K-line chart of the last period (at the end of 2015). In the data analysis, the data of each trading day from January 1, 2008 to November 27, 2015 are selected for analysis.

From the empirical study of K line graph and data, Fibonacci sequence can really help analyse and forecast in the Shanghai stock index of A-share markets. But there is also a certain degree of bias that investors should be cautious, such as technical analysis bias and calculation bias.

REFERENCES

[1] Anderson, R. M., Bianchi, S. W., & Goldberg, L. R. (2012). Will my risk parity strategy outperform? *Financial Analysts Journal*, *68*(6), 75-93.

[2] Basu, S. (1983). The relationship between earnings' yield, market value and return for NYSE common stocks: further evidence. *Journal of Financial Economics*, *12*(1), 129-156.

[3] Chen, C. D., Demirer, R., & Jategaonkar, S. P. (2015). Risk and return in the chinese stock market: does equity return dispersion proxy risk? *Pacific-Basin Finance Journal*, *33*, 23-37.

[4] Chen, T. L., Cheng, C. H., & Teoh, H. J. (2007). Fuzzy time-series based on Fibonacci sequence for stock price forecasting. *Physica A Statistical Mechanics & Its Applications*, *380*(1-2), 377-390.

[5] Chi, C. A. N., & Shen, J. (2016). Screen winners from losers using simple fundamental analysis in the pacific-basin stock markets. *Pacific-Basin Finance Journal*, *39*, 159-177.

[6] Etminaniesfahani, A., Ghanbarzadeh, A., & Marashi, Z. (2018). Fibonacci indicator algorithm: a novel tool for complex optimization problems. *Engineering Applications of Artificial Intelligence*, *74*, 1-9.

[7] Hoffmann, A. O. I., & Shefrin, H. (2015). Technical analysis and individual investors. *Journal of Economic Behavior & Organization*, *107*, 487-511.

[8] Goldberg, L. R., & Mahmoud, O. (2013). Risk without return. *Social Science Electronic Publishing*.

[9] Sezer, O. B., Ozbayoglu, M., & Dogdu, E. (2017). A deep neural-network based stock trading system based on evolutionary optimized technical analysis parameters. *Procedia Computer Science*, *114*, 473-480.

[10] Shen, K. Y., & Tzeng, G. H. (2015). Combined soft computing model for value stock selection based on fundamental analysis. *Elsevier Science Publishers B. V.*, *37*, 142-155.

[11] Tanaka-Yamawaki, M., & Tokuoka, S. (2007). Adaptive use of technical indicators for the prediction of intra-day stock prices. *Physica A Statistical Mechanics & Its Applications*, *383*(1), 125-133.