Investor Sentiment and Volatility of Stock Index
--An Empirical Analysis from the Perspective of Behavioral Finance

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Abstract – In this paper, some proxy indicators are selected to represent market sentiment. Then a principal component analysis is applied to those indicators to construct a market sentiment index. The result shows that this index has a strong correlation with shanghai composite index which stands for the trend of stock market. The market index is helpful to estimate the future trend of stock market.

Key Words - Market Sentiment Index; Principal Component Analysis

1. Introduction

Modern economics is different from the other social sciences. Economists use sophisticated mathematical tools to create numerous sophisticated economic models and to analyze economic problems. As a branch of economics, finance is deeply affected by these ideas. Economists usually assume that security investors are rational. They follow the principle of maximum utility and risk aversion in their individual investments. And the price of security products fully reflects the understanding of information within investors or the other market participants. The price of security is random and unpredictable, no one in the market can continue to profit.

However, the traditional rational person hypothesis has been unable to explain various economic anomalies appearing in financial markets. In this situation, behavioral finance is coming up to systematically challenge of the modern mainstream financial theory [1]. It broke through the stereotype of traditional financial theory by re-examining the impact investors put on the market. Based on the development of psychological research, researchers simulate the actual decision-making process of the investors, which explained many market abnormal behaviors successfully. Investors' irrational mood tends to interact, infect each other. The irrationality would be further strengthened and amplified under the constant interference in the real world, thus affect the developing trend of the market. So the volatility of stock prices is not only subject to its intrinsic value, but also largely influenced by the psychology and behavior of the investors. Therefore, the study on investor sentiment which could reflect investors' psychology and behavior has a certain practical significance for grasping the operational characteristics of the stock market. It is generally believed that the market sentiment affected by all kinds of information is investor's expectation which deviate from the future prices of risky assets. To a certain extent, it can reflect the expectations of investors in the market. It is based on this recognition that a market sentiment index is constructed by choosing indicators from different perspectives in this paper to provide some reference for investors to track the volatility of market index.

2. Empirical analysis

2.1 Indicators instructions

A large number of foreign empirical studies have found that investor sentiment can predict trend of stock index. Neal and Wheatley [2] thought that the discounts of closed-end fund as well as open-end fund's net purchase amount can be used as a proxy variable and to predict the future market gains. Brown and Cliff [3] studied many indirect investor sentiment indicators and emotional measure indicators and found a significant relationship between investor sentiment and recent market gains. They used investors' wisdom index as sentiment indicators and found that investor sentiment can affect asset pricing. Liu [4] thought liquidity indicators (LIQ) could be used to measure the mood of the market investors. LIQ is calculated by the income rate and trading volume. Based on those theories, the following indicators are selected to build investor sentiment index:

1) Price-earnings ratio. PE ratio reflects not only the price of the stock market, but also the sustained financial situation of companies in the macroeconomic environment. In general, the bigger the ratio values, the higher the market sentiment gets. As is shown in Figure 1,

PE ratio has a high positive correlation with the market index in history data. When PE ratio was on its peaks or troughs, the stock index was on the market top or bottom accordingly.
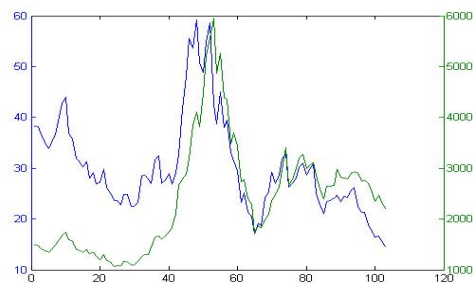

Figure 1 Trend of PE ratio and shanghai composite index

2)   Trading volume and turnover rate. They represent the market liquidity. When the investors are irritable, trading would be so frequent that the trading volume would be high as well as turnover rate. In the bull market in 2007, the weekly turnover rate can reach 5% to 6%. But when the market turned cool then weekly turnover became less than 1%. As Figure 2 shows, turnover ratio is ahead of the stock index. So it can be used as a leading indicator of stock market. At the same time, the trading volume is related to the Shanghai composite index strongly.
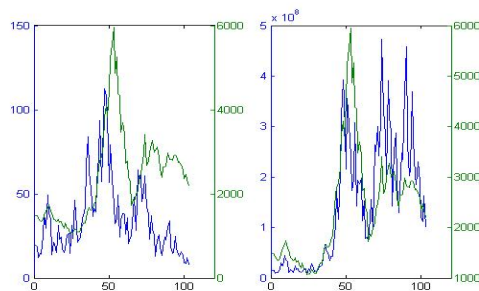

Figure 2 Trend of Turnover ratio and Trading volume compared with Shanghai Composite Index

3)   Discount of closed-end funds. As Neal and Wheatley said, variation in discounts of closed-end funds can reflect changes in investors' sentiment. In general, when investors are in high spirit, the discounts will be reduced, otherwise it will rise. Shown in Figure 3, discount of closed-end funds is related to the stock index in a way, but it did not behave like we have ever thought. The reason of this fact might be that the time after the first fund management company appears in China is not long. Closed-end funds have long been marginalized in China, the development of closed-end funds slow than the other financial products. So, the positions institutional investors took in the stock market may be a better indicator to approximately reflect institutional investors' recognition and attitudes on the current stock market.
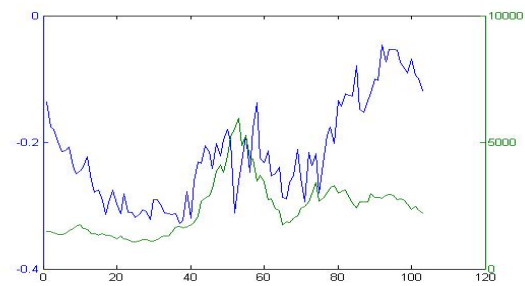

Figure 3 Discount of closed-end funds compared with Shanghai Composite Index

4)   Amount of new accounts. The number of new accounts reflects the mood of the spectators to the current market. When the situation turn well, a lot of new accounts and new liquid capital are turned up, that raises market sentiment.
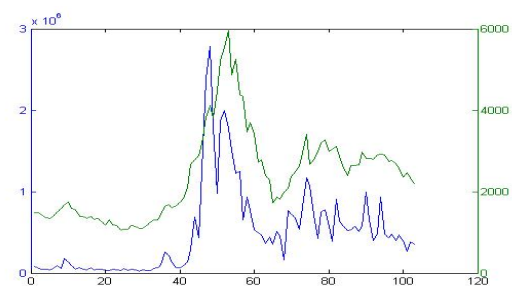

Figure 3 Amount of new accounts compared with Shanghai Composite Index

5)   VIX Index. VIX is a trademarked ticker symbol for the Chicago Board Options Exchange Market Volatility Index. Often referred to as the fear index or the fear gauge, it represents one measure of the market's expectation of stock market volatility over the next 30 day period. In this paper, VIX is used to represent the foreign market's expectation. A high VIX indicates that market participants expected the fluctuation of market will become more intense. In the contrary, a low VIX means market participants could be easy for risks. Figure 4 shows that VIX Index has a strong relevance with shanghai composite index but lags behind it.
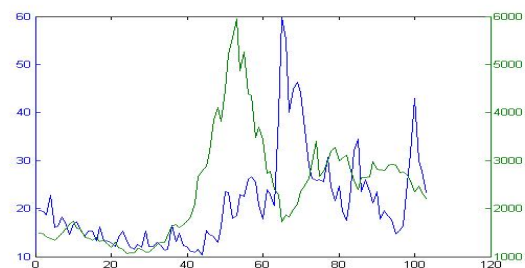

Figure 4 VIX Index compared with Shanghai Composite Index

2.2 Principal Component Analysis

In summary, the mentioned indicators were selected as the original variables. After standardizing the data, the principal component analysis method was applied to the

data. The result shows that the first main component contains almost half of the information in the original data. So it can be used as the investor sentiment index. The first main component could be calculated from six indicators we selected. The value in the table indicates the proportion of the original indicators in the first main principal component.

Table1 Proportion of Original Indicators in First Principal Component

Indicators	PE ratio	Trading volume	Turnover rate	Closed-end funds Discount	New accounts amount	VIX Index
First main component	0.4330	0.4847	0.4703	0.1023	0.5858	0.0531

The first main principle component is a proper estimate of market sentiment. The correlation coefficient of Shanghai Composite Index and the first main principle component is as high as 0.79. Figure 5 show that they almost have the same trend.
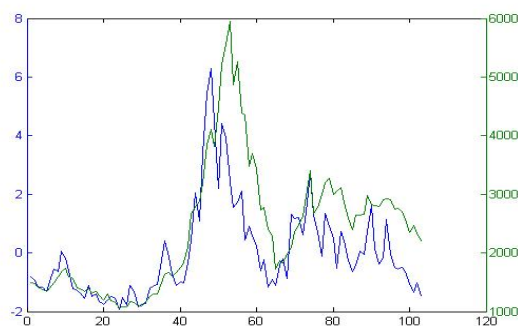

Figure 5 Market Sentiment Index compared with Shanghai Composite Index

3. Conclusion and policy suggest

Combining with above analysis, we can see the market sentiment index is largely consistent with the trend of Shanghai Composite index and has a strong positive correlation with the stock index. So it can be used to forecast the market's future trend.

Furthermore, it is human being' instinct to pursue interests and avoid risks according to the theory of behavioral economics. In the bull market, investors are extremely optimistic and the index will rise. But the investment enthusiasm cools, people tend to question the previous excesses behavior and lock in gains. A peak in the stock market would be formed. So when the investors are extremely optimistic or pessimistic, the market sentiment index will be on the bottom or top in the short term. That means there will be likely a turning point of the stock market trend. So the market sentiment index will be helpful for investors to find market bottoms or peaks in the short term.

In this paper, proxy indicators of market sentiment are selected as many as possible from all aspects related to the market sentiment. Then a principal component analysis is applied to those indicators to construct the market sentiment index which has certain reference value in the actual investment for all the investors. At the same time, it will be helpful for the regulator to guide and regulate market behavior.

References

[1]Li Xindan, Behavioral finance theory: research system and prospects, Financial Research, 1(2005)175-190.
[2] Robert Neal, Simon M. Wheatley, Do measures of investor sentiment predicts returns? , Journal of Financial and Quantitative Analysis, 33(1998)523-547.
[3]Gregory W. Brown, Michael T. Cliff, Investor sentiment and the near-term stock market, Journal of Empirical Finance, 11(2004)1-27.
[4]Liu Hongzhong, Investor sentiment and investment of listed companies, FuDan Journal, 5(2004)63-68.
[5] He Zhengfeng, MATLAB: Probability and Mathematical Statistics Analysis, Machinery Industry Press, Beijing, 2012, pp.384-394。

Vitae

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