Investor Sentiment on the Effects of Stock Price Fluctuations

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Abstract. In this paper, based on the behavioral finance theory and the BW method, the proxy index that can accurately reflect the investor’s sentiment is chosen, using principal component analysis to construct the investor’s sentiment comprehensive index. Then the authors establish VAR model to study the impact of investor sentiment on the stock price volatility in China. The results show that the volatility of stock price in China’s securities market is affected by investor sentiment and the impact has lag effect.

1. Introduction

As an important part of behavioral finance theory, investor sentiment has drawn wide attention from the insiders. The existing research shows that the volatility of stock prices in China’s securities market will be affected by investors’ behavior [1]. De Long, Shleifer, Summers and Waldman (DSSW) first introduced investor sentiment into the stock price model as an influencing factor, and pointed out that the price of financial assets in the securities market would change with investor sentiment. Investors will be interfered with each other, which may cause arbitrageurs in the securities market can not completely offset the irrational behavior of investors, so there will be errors in pricing [2]. That is to say, in behavioral finance, investors are not completely rational and the market is ineffective.

At present, scholars have a lot of research on investor sentiment. Lee explored the relationship between investor sentiment and securities market by using the generalized autoregressive conditional heteroscedastic (GARCH) model. The result shows that investor sentiment is positively correlated with stock price return [3]. Brown and Cliff found that individual and institutional investor sentiments were highly correlated with stock market returns during the same period [4]. The results of Wang and Sun show that the change of investor sentiment has significantly affected the fluctuation of the stock price in China, and investor sentiment is a systemic factor that has certain interference with the stock returns in China’s securities market [5].

This paper constructs the composite index of investor sentiment using principal component analysis [6], to explore the impact of irrational behavior of investors on stock price fluctuation in China. The sample period is 2006-2015, covering the bull market and bear market in China’s securities market, which can comprehensively explore the investor behavior and explain the high turnover rate and other phenomenon.

2. Research Design

2.1 Variables

Investor sentiment is complexity and diversity. A single indicator cannot be considered comprehensively [7]. We select many indicators to construct the investor sentiment index by using principal component analysis. Considering the availability of data and the characteristics of China’s securities market, this paper selects four of turnover rate (TURN), IPO first return (IPOR), new increased account number (NIA) and consumer confidence index (CCI). In Table 1, there is a high correlation between sentiment indicators. It is more accurate to construct investor sentiment using a combination of indicators than a single indicator.
Table 1. Descriptive statistics of emotional indicators.

<table>
<thead>
<tr>
<th></th>
<th>CCI</th>
<th>IPOR</th>
<th>NIA</th>
<th>TURN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>105.6442</td>
<td>7.5591</td>
<td>143.9858</td>
<td>267.9266</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>4.3400</td>
<td>10.8266</td>
<td>163.8266</td>
<td>153.1772</td>
</tr>
</tbody>
</table>

The sample period is 2006-2015, and monthly data were taken. The definition of each indicator is as follows: TURN is the weighted turnover ratio of the circulating market capitalization of Shanghai and Shenzhen in each month; IPOR is the monthly data; NIA is Shanghai and Shenzhen opened a new monthly investor accounts; CCI for the monthly data. This paper selects the Shanghai Composite Index as the original data, stock returns indicators calculated based on the closing price, and the formula is:

\[ R_t = \frac{(P_t - P_{t-1})}{P_{t-1}} \]  

2.2 Model

In this paper, we use principal component analysis method. Baker and Wurgler pointed out that because of the leading-lag effect of the proxy variables of investor sentiment, these variables could reflect it in different periods [8]. We use their method to construct the investor sentiment index. The steps are as follows: firstly, using the current and lagged periods of the selected four variables for a total of eight proxy variables to construct the principal component analysis. Then a linearly independent investor sentiment index is generated by weighted averagely using the principal components of 1-4 generations: the time series \( \text{SENT}_t \), and then the construction of indicators and the eight original proxy variables correlation analysis.

Table 2. The correlation coefficient between \( \text{SENT}_t \) and the eight proxy variables.

<table>
<thead>
<tr>
<th></th>
<th>TURN</th>
<th>TURN(-1)</th>
<th>IPOR</th>
<th>IPOR(-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SENT(_t)</td>
<td>0.8108</td>
<td>0.8210</td>
<td>0.4863</td>
<td>0.5003</td>
</tr>
<tr>
<td>NIA</td>
<td>0.9353</td>
<td>0.9082</td>
<td>0.5476</td>
<td>0.5512</td>
</tr>
</tbody>
</table>

According to Table 2, the emotional indicators \( \text{TURN}_{t-1}, \text{IPOR}_{t-1}, \text{NIA} \) and \( \text{CCI}_{t-1} \) with relatively large correlation coefficients are selected as the variables to construct the investor’s sentiment index. Since these variables in the stock market will be affected by the macroeconomic performance, this influence should be eliminated when constructing emotional indicators [9]. In this paper, we choose the industrial growth rate (IG), the consumer price index (CCI) and the fixed asset investment growth rate (GTZ) in terms of production, consumption and investment to represent the economic cycle as the proxy variables for the macroeconomic performance [10], and finally construct the emotional composite index of the first three principal component weighted (the cumulative contribution rate of the first three principal components is 89.37%) investors as:

\[ \text{SENT} = 0.1053 \text{TURN}_{t-1} + 0.3211 \text{IPOR}_{t-1} + 0.1947 \text{NIA} + 0.3876 \text{CCI}_{t-1} \]  

3. Empirical and Results

3.1 The AR model of investor sentiment composite index \( \text{SENT} \)

We use augmented Dickey–Fuller (ADF) test before establishing the VAR model for emotional indicators. Then we get that the time series of the investor’s emotional composite index is stable and ARMA (p, q) can be modeled.

Building an investor sentiment composite index \( \text{SENT} \)’s AR Model. It can be seen from Table 3
that the composite index SENT of investors with lagged fifth order is obviously at a confidence level of 5%, which shows that the composite index of investors’ sentiment is better and can reflect the sentiment of investors in China’s securities market better.

3.2 VAR analysis of investor sentiment composite index and Shanghai composite index

It can be seen from the above that the SENT sequence of the composite index of investor sentiment is a stationary series. After the ADF test, the yield of SZZS is also stable. Therefore, a binary V AR model can be set up to avoid the internal or external.

The key to establishing a V AR model lies in choosing the most suitable lag order. In this paper, we use the information criterion method and the AIC and SC criteria to determine the most appropriate lag order in a binary V AR model. Lag order corresponding statistics, vector auto regression model lag period of 4 is the most appropriate order that the Shanghai Composite Index yield SZZS and investor sentiment composite index formed by the V AR model has a better effect. As can be seen from Table 4, the V AR model is expressed as follows:

\[
SZZS = 12.859 + 0.947\text{SENT}(-1) + 0.406 + \text{SENT}(-2) + 0.423\text{SENT}(-3) + 0.109\text{SENT}(-4) \quad (3)
\]

3.3 Granger causality test

Granger causality test can be used to test whether the economic variables really have causal relationship with each other. This article tests the yield of Shanghai Composite Index SZZS and
investor sentiment index SENT Granger causality test, further analysis of the causal relationship between the two.

Table 5. Granger causality test results of SZZS and SENT.

<table>
<thead>
<tr>
<th>Lags: 4</th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Null Hypothesis:</td>
<td>Obs</td>
<td>F-Statistic</td>
<td>Prob.</td>
<td></td>
</tr>
<tr>
<td>SENT does not Granger Cause SZZS</td>
<td>115</td>
<td>0.49068</td>
<td>0.01296</td>
<td></td>
</tr>
<tr>
<td>SZZS does not Granger Cause SENT</td>
<td>12.8417</td>
<td>0.07426</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It can be seen from Table 5 that under the 5% significance level, SENT is the Granger reason for the SZZS return rate of Shanghai Stock Exchange. At 10% significance level, the SZZS return rate of Shanghai Composite Index is investment. The Granger sentiment composite index SENT Granger reason, which illustrates the mutual Granger reason, and investor sentiment on the Shanghai Composite rate of return have greater impact.

4. Conclusion

Investor sentiment and the Shanghai Composite stock return roughly the same trend, and in the Granger causality test also get the conclusion of the mutual causal relationship between investors sentiment on the stock market, in turn, the securities market to investors’ emotions also has an impact. In addition, according to the results of Granger causality test, the influence of investor sentiment on the securities market is greater than that of the stock market on investor sentiment. Our study also confirms the lagged effect of investor sentiment.

The empirical results show that the investor sentiment in China will have a relatively long-term impact on the volatility of the stock price in China and the disturbance to the stock price volatility is on the rise. China’s securities market is still in its development stage. Its overall quality is not high and easily affected by market sentiment, which eventually leads to serious systemic risks. Management should face up to the current lack of development of the securities market in China, strengthen investor sentiment, pay attention to the implementation of the regulatory measures and should also be take precautionary measures.

References


