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Stock market behavior and investor sentiment: Evidence from China

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Abstract The relationship among stock returns, market volatilities and individual investor sentiment is an important topic in behavioral economics and finance. This paper uses a unique data set—China's newly opened stock trading accounts to test the relationships among stock returns, volatilities and individual investor sentiment in the Chinese stock market. It is found that there is a positive relationship between shifts in sentiment and stock returns, and that shifts in sentiment are negatively correlated with market volatility, that is to say, volatility increases (decreases) when investors become more bearish (bullish).

Keywords investor sentiment, volatility, newly opened stock trading accounts

摘要 股票市场行为与投资者情绪关系是行为经济学和金融学研究的一个重要内容。运用中国股市投资者新开帐户数目这一独特的情绪指标来检验股市收益、波动和投资者情绪的关系,发现股市收益和投资者情绪指标存在正向关系;市场波动与投资者情绪负相关。

关键词 投资者情绪, 波动, 新开帐户数

1 Introduction

There has been a growing debate on the possible linkages between the behavioral

Received November 14, 2007

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aspects of investors and stock prices in recent years. The notable work of De Long, Shleifer, Summers and Waldman (DSSW, henceforth) (1990) models the influence of certain classes of investor sentiment on equilibrium prices. A direct implication of their theoretical propositions is that a group of investors are capable of affecting stock prices by means of unpredictable changes in their sentiments. Following DSSW (1990), several empirical studies have examined the role of investor sentiments on stock prices. For example, Lee et al. (2002) showed that sentiment was a systematic risk that was priced. Excess returns are contemporaneously positively correlated with shifts in sentiment. Baker and Wurgler (2004) tested the linkage between investor sentiment measured by market liquidity (i.e. turnover) and stock returns.

Existing research has predominantly focused on the investor sentiments and the U.S. stock market. However, little attention has been given to the emerging stock markets. And covering research to the largest and one of the most important stock markets—Chinese stock market is seriously lacking. Similar to Lee et al. (2002), we employ a generalized autoregressive conditional heteroscedasticity (GARCH) in-mean model to show that both the conditional volatility and returns in Chinese stock market are affected by investor sentiments.

Several direct and indirect measures of sentiment are quite prevailing in recent literature. For U.S. studies, the sentiment index provided by Investors' Intelligence of New Rochelle is commonly applied. Survey methods provoked the skepticism of many economists, which derives from the aphorism of "watch what I do, not what I say." Consequently, this paper favors a direct approach, that is, we use the number of newly opened stock trading accounts as a proxy of sentiment.

The remainder of the paper proceeds as follows. Section 2 presents the data source and the empirical model. Section 3 discusses the empirical results. Concluding remarks are provided in Section 4.

2 Data and model

2.1 Data

The paper uses the number of new investor stock trading accounts as proxies of sentiment index. Newly opened stock trading account stands for new demand for shares. When there is a bullish sentiment, the number of new accounts will certainly increase, and vice versa. The investors who initially open accounts are new investors. They are naive with little knowledge about the stock market. In general, small shareholders are supposed to act like noise traders; thus, the impact of noise trading on returns and volatilities can be analyzed. The number

of new accounts is a very good proxy for sentiment, which has not been used in academic research, to the best knowledge of the authors. Thus, it seems to be a promising attempt to work with this sentiment index for China and to derive implications for other emerging financial markets. The paper uses this unique data set and attempts to find out interesting conclusions.

The sentiment index shown in Fig. 1 is collected at the end of each week (month). The weekly data are only available from May 30, 2005 to June 8, 2007 (105 observations in all), and that of monthly data from December 2003 to April 2007 (41 observations in all). The account data are obtained from China Securities Depository and Clearing Corporation¹. The price index is Shanghai composite index, which is widely accepted as the representative index of Chinese stock market. Fig.1 demonstrates the rapid growth of both time series, especially new account numbers in the previous year.

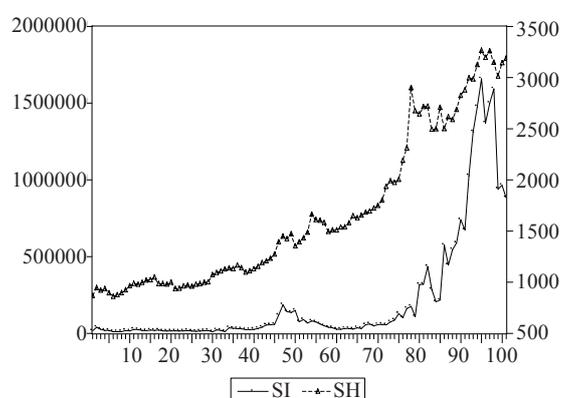


Fig. 1 Sentiment index (The number of newly opened accounts on a weekly basis) and Shanghai stock index

2.2 Model

According to DSSW (1990), the impact of noise trading on the price of risky assets is a result of interaction of four effects. The hold-more and price-pressure effects are related to the direction of shifts in noise trader sentiment, and influence mean returns directly. The Friedman and create-space effects are related to the magnitude of the shifts in noise trader sentiment, and influence mean returns indirectly through changes in noise traders' misperceptions of the assets risk.

To model the four effects of noise trading, we propose a TARCH-in-mean

¹ The data are available from http://www.chinaclear.cn/main/03/0303/030301/030301_1.html.

model, which can include contemporaneous shifts in investor sentiment in the mean equation and lagged shifts in the magnitude of investor sentiment in conditional volatility. The model takes the following form:

$$R_{it} = \alpha_{i0} + \alpha_{i1}\sqrt{h_{it}} + \alpha_{i2}\Delta SI_{it} + \varepsilon_{it} \quad (1)$$

$$h_{it} = \beta_{i0} + \beta_{i1}\varepsilon_{i,t-1}^2 + \beta_{i2}\varepsilon_{i,t-1}^2 D_{i,t-1} + \beta_{i3}h_{i,t-1} + \beta_{i4}\Delta SI_{i,t-1} \quad (2)$$

$$\varepsilon_{i,t} | I_{i,t-1} \sim N(0, h_t)$$

where R_{it} is the weekly (monthly) return of Chinese market index, ΔSI_{it} is a measure of noise trader risk associated with the weekly(monthly) shifts in sentiment. $D_{i,t}$ is a dummy variable. Equation (1) is a mean model: α_{i1} reflects the tradeoff between risks and returns, α_{i2} reflects the possible influence of investor sentiment on stock returns. Equation (2) is a conditional volatility model. In particular, we expect β_{i2} to be positive; that is to say, a negative shock is more likely to cause a larger upward revision of volatility than a positive shock of similar magnitude can do. This is because the leverage effect is greater for negative than for positive shocks. Indeed, Nelson (1991) found that news arriving in the market tends to affect volatility in an asymmetric manner, depending on the nature of the news. The coefficients β_{i4} in the conditional volatility equation (2) capture the effect of the magnitude of shifts in sentiment on volatility formation.

3 Empirical results

The estimated coefficients of the TARCH-M models for the Chinese stock indices in week and month frequency are reported in Table 1.

Table 1 Conditional volatility, return and sentiment index

| | Weekly (May 30, 2005 to June 8, 2007) | | Monthly (December 2003 to April 2007) | |
|-----------------------------------|--|---------|--|---------|
| | Coefficient | P value | Coefficient | P value |
| $\sqrt{h_{it}}$ | -1.333 392 | 0.013 2 | -3.574 952 | 0.000 0 |
| α_{i0} | 0.060 413 | 0.004 8 | 0.179 706 | 0.000 0 |
| ΔSI_{it} | 0.031 921 | 0.025 8 | 0.038 848 | 0.005 3 |
| β_{i0} | 0.000 412 | 0.000 0 | 0.000 732 | 0.000 0 |
| $\varepsilon_{i,t-1}^2$ | 0.085 293 | 0.036 7 | 0.179 401 | 0.019 6 |
| $\varepsilon_{i,t-1}^2 D_{i,t-1}$ | -0.252 321 | 0.000 0 | -0.278 282 | 0.001 8 |
| $h_{i,t-1}$ | 0.746 165 | 0.000 0 | 0.683 194 | 0.000 0 |
| $\Delta SI_{i,t-1}$ | -0.000 430 | 0.039 8 | -0.001 473 | 0.000 0 |

The major findings can be summarized as below:

First, the time-varying portion of returns varies inversely with conditional volatility. This shows that Chinese investors are rewarded when they take a moderate amount of risk and penalized when take high risks. These results are quite consistent with previous findings of a negative price for time-varying risk (Glosten, Jagannathan and Runkle, 1993, GJR hereafter). This relation, appears to contradict conventional predictions of capital asset pricing model, is likely to exist in time periods where the savings rate is high but alternative investment opportunities are limited (GJR, 1993). This is a very distinguished phenomenon in China, as Chinese citizens can only invest in domestic stock markets and can not invest directly overseas.

Second, we find that Chinese investor's sentiment is an important factor in explaining equity returns and changes in conditional volatility. The result sheds light on how sentiment and sentiment-induced noise-trading affect the tradeoff between risk and returns. In the mean equation for stock indices, a shift in sentiment has a significant positive impact on returns, regardless of the data frequency. In particular, when sentiment becomes more bullish, optimism induces noise traders to hold more of the risky assets than fundamentals would indicate, and thereby, secure the compensation for bearing the increase in risk associated with sentiment. On the other hand, when sentiment becomes more bearish, there is a reduction in excess returns. Noise traders choose to hold less of the risky assets when they are more pessimistic. Consequently, they are unable to capture the risk premium related to sentiment. Thus, a positive coefficient appears.

Third, we also find that the magnitude of the change in sentiment has a significant impact on the formation of conditional volatility. This shows that a drop in sentiment destabilize stock markets by triggering higher market volatility. An increase of shifts in sentiment in the current period lead to statistically significant downward revisions in the volatility of future returns.

Fourth, there exists adverse "leverage effect" in Chinese stock markets. It is worthwhile to devote more space to the stories behind the observation that the response is greater following positive shocks than negative shocks. According to Li (2004), under information asymmetry, Chinese investors are risk-lovers. When a stock market turns bullish, they tend to be panicked into purchasing stocks, in expectation that the stock prices will rise further. When the stock market turns bearish, however, they are less panicked into selling stocks, in hope that market downturns will not last for long. Definitely, they are aware of the possible existence and eventual burst of bubbles, but also subjectively believe that they will not encounter the bust of bubbles while their subsequent followers will.

Fifth, the results for weekly data and monthly data are similar, implying that the results are quite robust.

4 Conclusion

The paper uses a unique data-China's newly opened stock trading accounts, to test the relationships among stock returns, volatilities and individual investor sentiments. In contrast to prior empirical studies where noise trader risk is proxied by closed-end mutual fund discounts or survey data, the paper uses a direct measure of investor sentiment, which is more objective and reliable.

We find that there is a positive relation between shifts in sentiment and returns which indicates that the increase in risk premium associated with the hold-more effect is relatively more important than the negative impact of the price-pressure effect on expected returns in notable DSSW(1990) model.

It is also found that shifts in sentiment are negatively correlated with the market volatility; that is, volatility increases (decreases) when investors become more bearish (bullish). The significance of sentiment on conditional volatility implies that conventional measures of temporal variation in risk omit an important factor.

Acknowledgements This research is supported by the National Social Science Foundation of China (Grant No.07CJL014) and the National Science Foundation of China (Grant No. 70671053).

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