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Is there Herd Behavior in Insurance Sector Shares in China?

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Abstract

The herd behavior is an economic phenomenon in which investors rely excessively on opinion noise to make a trade when information is uncertain, leading to a convergence of trading strategies across the group. In the economic theory, the herd behavior is often described by the correlation between investors' decision-making behavior. The paper empirically analyses the herd behavior of the insurance sector in China's capital market based on the daily return data of the insurance sector from January 2019 to June 2021, and then uses the CSAD model for the daily return data of the insurance sector. The test results show that there is a herding behavior in the insurance sector on China's capital market during the special time period when public emergencies such as the outbreak of the COVID-19 and floods are frequent. This indicates that public emergencies such as the outbreak of the COVID-19 and floods can induce herding behaviour in the insurance sector on the capital market, that the rational decision-making ability of Chinese investors needs to be further improved, and that Chinese government departments should introduce corresponding policies and measures to improve market effectiveness during the special periods.

Keywords

Herd Behavior; Insurance Sector Shares; Empirical Analysis; Public Emergencies.

1. Introduction

After the outbreak of the COVID-19, a series of public emergencies occurred in China, such as the mega floods in the Yangtze River basin [1]. Thus, the safety of people's lives and property was threatened at the same time. To our surprise, China's capital markets were very volatile during this period, in particular, the capital markets plunged and surged in early 2020. What drove this wave? Exploring the reasons helped our government to adopt specific financial interventions to maintain the stability of our capital markets at particular times.

In retrospect, it can be seen that the post-SARS period saw a surge in popular demand for commercial insurance and a wave of favourable sentiment in the insurance sector of our capital markets as a result. So, in the post-COVID-19 period, the insurance sector in China's capital market also saw a wave of favourable conditions. But what was driving this wave of favourable conditions? This is a question worth exploring.

The herd behavior is an economic phenomenon in which investors rely excessively on opinion noise to trade when information is uncertain and thus lead to a convergence of trading strategies across the group, which is often rooted in inadequate and asymmetric information in the capital markets.[2] For this reason, the herding behavior is often described by correlations between investors' decision-making behaviour in economic theory. Currently, the mainstream methods for testing the herding behavior are usually the CCK test[1], the LSV test[3], and the CSAD model[4]. In general, the CCK test and CSAD model are often used to test the herd behavior of different sectors in the capital market[6]. While the LSV test is often used to test whether there is a herding behavior in the investment behaviour of a specific group of investors, whose core indicator is the number of investors buying and selling the same individual stocks, such as the investment behaviour of university students[7], which has a very significant herd

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behavior. It is worth noting that since the core indicator of the CSAD test is the absolute deviation of cross-sectional returns, this allows the CSAD test to overcome the shortcomings of the LSV test, which ignores stock turnover, and the CH test, which is less sensitive.

For a long time, herd behaviour in the capital market has been as a kind of irrational investment behaviour, and its impact on the stability of the capital market and the operation of economic activities has been one of the hotspots of widespread concern among academics, financial circles and relevant government departments. So, in the post- COVID-19 period, was the positive market of the insurance sector in China's capital market also driven by the herding behavior of investors? Studying these questions will help the government to curb excessive speculation, prevent and resolve financial risks, safeguard the normal operation of the stock market and take appropriate intervention measures to maintain the smooth operation of the stock market during the period of frequent public emergencies.

The remainder of the paper is organised as follows: Part II contains data description; Part III is empirical design; Part IV contains empirical design; Part V is empirical results; and Part VI contains the conclusion and recommendations.

2. Data Description

This article uses daily return data of five listed commercial insurance companies in China's insurance sector and the daily return rate of the SSE Index. The raw data of which are obtained from the RESSET financial research database. The daily return of the SSE Index is provided by the RESSET Financial Research Database. For details of the calculation method, please refer to the information available on the official website of the RESSET Financial Research Database, which will not be elaborated in this paper.

The sample period selected for this article is 2 January 2019 to 30 June 2021, with a total of six hundred and five days of yield data. This sample period includes the three periods before, during and after the outbreak of the COVID-19, and the flooding period in the past two years, to test whether there is a herding behavior in this period. The result can reflect the irrational investment behavior of the public in the face of public emergencies.

3. Empirical Design

Chang, Cheng and Khorana were the first to propose a cross-sectional absolute deviation method of measuring the herding behavior (the "CSAD test")[5], which is based on a non-linear relationship between deviation and market return to assess the herd behavior. Because the CSAD test overcomes the shortcomings of the LSV test, which ignores stock turnover, and the CH test, which is less sensitive, the CSAD test is chosen as the research method in this paper, with appropriate adjustments made to its application.

The basic formula of the CSAD test method is:

$$CSAD_t = \frac{1}{n}\sum_{i=1}^{n}\left|R_{it} - R_{mt}\right| \tag{1}$$

n is the number of stocks in a portfolio, Rit is the return on stocks in period t and R_{mt} is the market return on the stock market in period t.

Based on CAPM model proposed by Sharp in 1964, the expected return on a stock can be expressed as

$$E\left(R_{it}\right) = r_f + \beta_i\left[E\left(R_{mt}\right) - r_f\right] \tag{2}$$

where rf is the risk-free rate, usually considered to be the rate of short-term treasury bills, βi is the risk factor of stock i, and E(Rm) is the expected return of the stock market.

Deforming equation (2) yields.

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$$E\left(R_{it}\right)-E\left(R_{mt}\right)=\left(\beta_i-1\right)\left[E\left(R_{mt}\right)-r_f\right] \tag{3}$$

Taking absolute values of both sides of equation (3) simultaneously gives (in general, the expected return on the market portfolio is not less than the risk-free rate of return)

$$\left|E\left(R_{it}\right)-E\left(R_{mt}\right)\right|=\left|\beta_i-1\right|\left[E\left(R_{mt}\right)-r_f\right] \tag{4}$$

Summing up equation (4) yields

$$\frac{1}{n}\sum_{i=1}^{n}\left|E\left(R_{it}\right)-E\left(R_{mt}\right)\right|=\frac{1}{n}\sum_{i=1}^{n}\left|\beta_i-1\right|\left[E\left(R_{mt}\right)-r_f\right] \tag{5}$$

The combination of equation (1) and (5) gives

$$E\left(CSAD_t\right)=\frac{1}{n}\sum_{i=1}^{n}\left|\beta_i-1\right|\left[E\left(R_{mt}\right)-r_f\right] \tag{6}$$

After taking the first and second order derivatives of equation (6) separately, we get

$$\frac{\partial E\left(CSAD_t\right)}{\partial E\left(R_{mt}\right)}=\frac{1}{n}\sum_{i=1}^{n}\left|\beta_i-1\right|>0$$

$$\frac{\partial^2 E\left(CSAD_t\right)}{\partial E\left(R_{mt}\right)^2}=0$$

Obviously, since the second order derivative is equal to zero, the first order derivative is a constant, and since the value of the first order derivative is greater than zero, the expectation $E(R_{mt})$ of the market return in period t and the expectation $E(CSAD_t)$ of the absolute deviation of the cross-sectional return in period t show a linear increasing relationship. When investors in the stock market share similar investment philosophies, the changes in share prices tend to be the same, which in turn causes the returns of individual stocks in the stock market to converge towards the market return, thus disrupting to some extent the linear increasing relationship between the market return R_{mt} in period t and the absolute deviation of cross-sectional returns CSAD in the same period. Therefore, to better highlight this relationship between $CSAD_t$ and Rmt, we add a quadratic term R^2_{mt} to the linear relationship between $CSAD_t$ and R_{mt}. Also, since $E(CSAD_t)$ and $E(R_{mt})$ are unmeasurable, they are replaced by $CSAD_t$ and R_{mt} respectively, so we can establish the regression equation as follows.

$$CSAD_t=\alpha+\beta\left|R_{mt}\right|+\gamma R_{mt}^2+\varepsilon_t \tag{7}$$

$$CSAD_t=\alpha+\beta\left|R_{mt}\right|+\varepsilon_t \tag{8}$$

Therefore, the test for herding behaviors based on the above methodology is essentially a test of the correlation coefficients of equations (7) and (8) above. The expected results are as follows: if the coefficient on the primary term of equation (7) is β significantly negative, this indicates a significant herding behavior in the market. If the coefficient of the primary term of equation (7) is significantly positive, then a judgement needs to be made on the coefficient γ of the quadratic term of equation (7): if the coefficient γ of the quadratic term is significant or negative, it indicates that there is a herding behavior in the market; if γ is not statistically significant, then the coefficient β of equation (8) needs to be tested. If β is significantly positive and can pass the t-test, it means that it can basically be assumed that there is no herding behavior in the capital market.

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4. Empirical Results

Firstly, the scatter plot of the relationship between $|R_m|$ and CSAD is plotted using |Rm| as the horizontal coordinate and CSAD as the vertical coordinate after calculating the two indicators in the CSAD test based on the sample data. From Figure 2, except for the extreme values, which are distributed in a disorderly manner and deviate from the majority of the scatter points, all the scatter points are concentrated in the lower left corner of the $|R_m|$=0.04*0.04=CSAD region, and it can be simply deduced that the scatter point concentration trend is very significant. The scatter plot of the relationship between $|R_m|$ and CSAD in Figure 2 shows a clear linear relationship between $|R_m|$ and CSAD. Therefore, it can be tentatively judged from Figure 2 that the herding behavior of the insurance sector in China's capital market is relatively obvious during the period of frequent public emergencies in China.

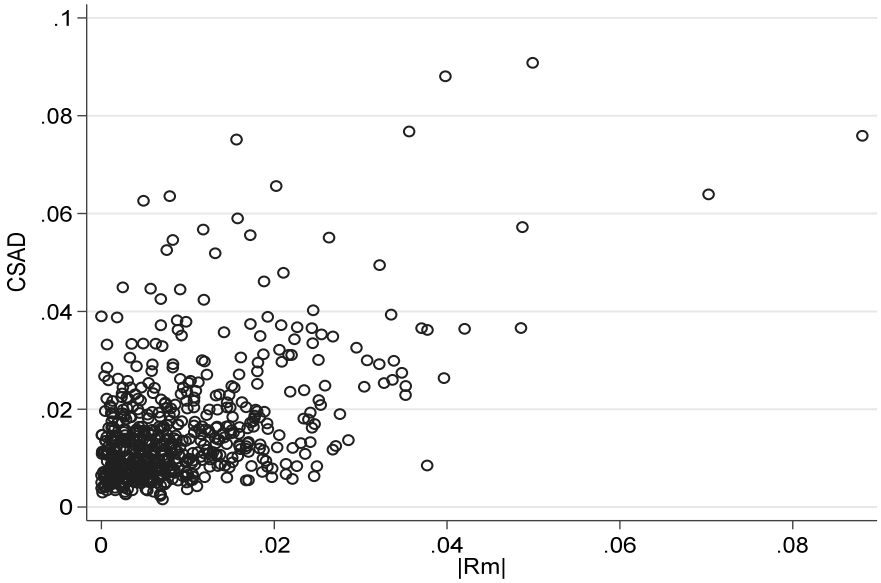

Figure 1. The scatter plot of the relationship between $|R_m|$ and CSAD

Secondly, results of the empirical analysis obtained from the CSAD model, which was selected on the basis of the previous comparative merit and treated with appropriate adjustments, are shown in Table 1 below. As shown in Table 1, |Rm| passes the t-test at the 1%, 5% and 10% significance levels, and R_m^2 passes the t-test at the 5% and 10% significance levels, indicating that the model regression is effective. According to the criteria for determining herding behaviors set out in Section 3 above (i.e. "A significantly negative coefficient on the primary term indicates that there is a significant herding behavior in the market. If the primary coefficient is significantly positive, the secondary coefficient γ is required: if the secondary coefficient γ is significant or negative, the market has a herding behavior; if γ is not statistically significant, the other equations need to be further tested."). , this paper concludes that the regression coefficient β of $|R_m|$ is greater than zero and significant, and the regression coefficient γ of R_m^2 is also greater than zero and significant, so there is a significant herding behavior in the insurance sector in China's capital market in the sample period chosen for this paper.

However, considering the R^2 = 0.280 of the model, this indicates a poor fit of the model, i.e. the explanatory power of the model is relatively poor. Therefore, this paper suspects that the pre-determined CSAD model may have serial correlation problems. To address this issue, the next part of this section will use the LM test and autocorrelation test to examine the serial correlation

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of the model and attempt to modify the model to address the serial correlation problem of the predetermined CSAD test.

Table 1. Result of CSAD test

csad	Coef	Robust Std. Err	t	P>|t|
$\|R_m\|$	0.4944***	0.0980	5.05	0.000
R_m^2	4.4590**	2.0250	2.20	0.028
Constant	0.0105***	0.000643	16.31	0.000
R-squared	0.280		F-statistic	54.14

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

From Table 2, the LM test results of the CSAD model set up in this paper show that the original hypothesis is rejected at the 5% significance level and the residual series of the regression equation set up in this paper is correlated; the autocorrelation test results of the CSAD model set up in this paper show that the Q statistic rejects the original hypothesis at the 5% significance level and the regression equation set up in this paper does have first-order serial correlation. In summary, it can be concluded that the CSAD model set up in this paper does have serial correlation problems.

Table 2. Model series correlation test results

lags(p)		Statistic	Prob>chi2
2	LM_chi2	16.423	0.0003
	Q_chi2	11.335	0.0035

Finally, the remainder of this section will amend the original set CSAD model and perform another regression analysis on the new amended model. The paper starts with a first order regression analysis of the residuals of the original model, which yields the following equation.

$$\varepsilon_t=0.5245\varepsilon_{t-1}+\mu_t \quad (9)$$

This equation is then collapsed by substituting it into the original set CSAD model to obtain the new revised model as

$$CSAD-0.5245*CSAD=\beta_0+\beta_1*(R_m-0.5245R_m(-1))+\beta_2*(R_m^2-0.5245*R_m^2(-1))+\varepsilon_t \quad (10)$$

Table 3. Test results after modifying the model

Numble	Coef.	Std. Err.	t	P>t
R_m-0.5245 R_m(-1)	0.257634***	0.0708	3.64	0.0000
R_m^2-0.5245 R_m(-1)	-0.30383	1.553	-0.2	0.8450
_cons	0.004873***	0.0005	9.74	0.0000
R-squared	0.0852		Adj R-squared	0.0814
3	213		654	649

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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The results of the OLS regression of the revised new model are shown in Table 3. The goodness of fit of the revised new model did not improve, which means that the explanatory power of the revised new model did not improve. However, more importantly, the conclusion of the revised model is consistent with the conclusion of the uncorrected model, i.e. $\beta_1>0$ and β_1 passes the t-test, while β_2 is negative, so there is indeed a herding behavior in the insurance sector of China's capital market during the selected study period.

5. Conslusion and Recommendations

This paper investigates the herding behavior of the insurance sector in China's capital market by using the daily return data of the insurance sector in China's stock market during the period of frequent public emergencies from January 2019 to June 2021 and the daily return of the Shanghai Stock Exchange Index from the RESSET financial research database, using the CSAD test. The findings of this paper show that during periods of frequent public emergencies, investors are prone to herd buying shares of listed commercial insurance companies, which leads to the occurrence of herding behavior in the insurance sector in the capital market and further increases in capital market instability.

For government, in order to improve the stability of our capital market, it should play the role of the "visible hand", such as reducing the cost of financing and financing securities, expanding the number of existing financing and financing securities, improving the information disclosure system etc. In addition, Emphasis should be placed on strengthening investor education and guiding investors to establish the correct investment philosophy, so that investors become more rational and short-term speculative behaviour is reduced.

For investors, they should cultivate the concept of rational investment and establish the concept of value investment, and continuously learn and master professional knowledge to reduce the emergence of their own irrational investment behaviour of chasing up and killing down. When making investment decisions, Chinese investors should fully understand the financial data affecting price of individual stocks. Facing major public emergencies that lead to stock price fluctuations, investors should keep calm and make rational analyses and decisions, rather than being overconfident and blindly following the trend of investment.

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