Herding In Chinese Stock Market: Evidence from Two Stock Exchanges

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Abstract: This paper investigates herding in dual-listed Chinese A-share and B-share stocks by using daily data of 87 Chinese stocks between 2009–2016. Based on the CCK model, we find that the A-share and B-share markets of the two stock exchanges both have herding behavior. There is asymmetry in the herd behavior of Chinese stock market, The B-share market has a stronger herd effect when the volatility is high and the trading volume is large, and herding is more obvious when the volatility of the A-share market is high. We explore the difference between spurious (informational) and intentional (non-informational) herding in the Chinese market, the intentional herding in Chinese stock market is obvious.

1. Introduction

The modern financial theory system is quite perfect at present, especially the capital asset pricing model (CAPM), the Fama-French three-factor model and the market effective hypothesis all play a vital role in supporting the entire financial theory system. With the emergence of irrational investment behavior in the investment market, many scholars suspect that traditional financial theory can’t explain the "financial vision" reasonably. Therefore, the behavioral finance theory emerges and fills these gaps.

Christie and Huang (1995) suggest that herding behavior describes a condition where the economic decision-making process of a large number of investors is based on market consensus rather than individual reason, Such behavior can exist when numerous investors choose to ignore their private information and mimic market movements [1]. Chiang and Zheng (2010) study the herd behavior in the global stock market through the CSAD indicator, find that the stock market in developed countries (except the US) and the Asian stock market have herd behavior [2]. Bohl et al (2017) suggest that the herding is more serious than what we think. He pointed out that when we use the CCK model to test the herding effect, the disturbance term in the mean equation does not obey the positive distribution, but obeys the student distribution. Therefore, herding behavior should be more obvious than the result we detected with the CCK model [3].

Chinese stock market is still an emerging market, investors' investment awareness needs to be improved, the market's supervision and management mechanism still needs to be improved, and the information transmission mechanism in the market is not perfect. It is necessary to study whether there is herding behavior in Chinese stock market. Therefore, this paper studies whether there is herding behavior in the Chinese stock market.

2. Data and methodology

2.1 Indicator and model selection

Christie and Huang (1995) suggest that the investment decisions of market participants depend on the overall market conditions [1]. In the normal period of the stock market, rational individual investors trade on their own private information, so the dispersion of returns will increase as the absolute value of market returns increases. However, in the extreme market period, individuals tend to suppress their own beliefs, and their investment decisions are more likely to be based on collective

action in the market. Therefore, they suggest that the individual stock returns will fluctuate around the market yield and propose CH model.

Chang (2000) suggest that the CH model is too harsh. They solved the above problem better by establishing a CCK model. He suggested that herd behavior occurred throughout the time interval of the study sample, not only when the market was in an "extreme" state, but only the strength of group behavior [4]. This paper tests the herd behavior of Chinese stock market based on the CCK model. The CCK model uses the absolute deviation of the cross section (CSAD) to measure the dispersion of sample yield. The herding test of CCK facilitates the detection of herding over the entire distribution of market return with the following specification:

$$CSAD_t = \alpha + \gamma_1 | R_{m,t} | + \gamma_2 | R_{m,t} |^2 + \varepsilon_t$$

The left-hand-side variable, $CSAD_t$, is a measure of return dispersion, which is measured by the cross-sectional absolute deviation:

$$CSAD_t = \frac{1}{N} \sum_{i=1}^{N} | R_{i,t} - R_{m,t} |$$

Where $R_{i,t}$ represent the yield of individual stocks i at time t, $R_{m,t}$ represent the market portfolio yield at time t, and N is the number of portfolio assets at time t.

2.2 Data

Based on the empirical method of Tan et al (2008)[5], this paper select the stock companies that issue A and B shares simultaneously on the Shanghai exchange or the Shenzhen exchange as the research object, there are 45 firms that are dual-list A and B shares on the Shanghai exchange, and 42 firms that dual-list A and B shares on the Shenzhen exchange. The sample interval is from January 1, 2009 to December 31, 2016. The data obtained includes daily data of 87 listed company stocks, including closing price, daily trading volume, daily volatility and price-earnings ratio.

In this paper, we use the logarithmic rate of return when calculating the stock return rate. The stock return rate is calculated as $R_t=100\times (\log(P_t)-\log(P_t-1))$. because the pricing of B shares is expressed in Hong Kong dollars or US dollars,in order to remove the exchange rate risk, we use the exchange rate of the day to adjust the stock price.

3. Empirical results

3.1 Tests for herding

This paper use the CCK model of Chang (2000) to detect whether there are herding in four stock markets including Shenzhen A-share market(SZA), Shenzhen B-share market(SZB), Shanghai A-share market(SHA) and Shanghai B-share market(SHB).The model is as follows:

$$CSAD_t = \alpha + \gamma_1 | R_{m,t} | + \gamma_2 | R_{m,t} |^2 + \varepsilon_t \quad (1)$$

Where $R_{m,t}$ represent the market yield of each market, in this paper, $R_{m,t}$ is the equal weighted average yield of the subsample , We are divided into four subsamples based on four different markets. The observation method of detecting the herding in this paper is to test whether $\gamma 2$ in eq(2) is statistically significant negative, which means that as the market yield increases, the dispersion degree of individual stock returns decreases with the decline of herd behavior, and this is the evidence of herding.

Table 1 Analysis of herding behavior in four stock markets

Eq (1)	SHA	SHB	SZA	SZB
α	1.283	0.693	1.333	0.906
	(54.12)***	(54.88)***	(57.51)***	(62.71)***
γ_1	0.257	0.269	0.198	0.253
	(12.40)***	(20.71)***	(9.29)***	(16.62)***
γ_2	-0.020	-0.025	-0.013	-0.021
	(-7.02)***	(-14.30)***	(-4.05)***	(-9.373)***
Adjusted R^2	0.116	0.216	0.088	0.174

As show in table1, In the all stock exchanges, the coefficients γ_2 in the CCK model are all negative at the 1% significance level. The results indicate that there are significant herd behavior in the stock markets of both Shanghai and Shenzhen exchanges. Not only the A-share market have herding, but also the B-share market have. Investors in the B-share market are institutional investors approved by the Securities Regulatory Commission. This means that transactions between institutional investors are also imitated and flocked.

3.2 Asymmetric herding

In the previous section, we suggest that the herding exist in the both Shanghai and Shenzhen exchange. In this part, we study whether the herd behavior will be asymmetrical with different market conditions. We chose the volatility and trading volume as the market conditions.

When we use the volatility of the market portfolio as a market condition to test whether the herd behavior produces asymmetry under different volatility conditions. The strategy for distinguishing between high and low volatility is that when the volatility at time t is greater than previous 30 days moving average, then we characterize the volatility at time t is high, and vice versa, we use each market for volatility.The possible asymmetric effects are examined by using the following empirical specifications:

$$CSAD_t = \alpha + \gamma_1 D_t \mid R_{m,t} \mid + \gamma_2 (1 - D_t) \mid R_{m,t} \mid + \gamma_3 D_t (R_{m,t})^2 + \gamma_4 (1 - D_t)(R_{m,t})^2 + \varepsilon_t \quad (2)$$

$$D_t = \begin{cases} 1 & Volatility_t \quad is \quad high \\ 0 & Volatility_t \quad is \quad low \end{cases} \quad (3)$$

Table 2 Herding based on the asymmetry test of volatility

	SHA	SHB	SZA	SZB
$\gamma 1$	0.242	0.303	0.186	0.282
	(9.92)***	(21.07)***	(7.21)***	(15.61)***
$\gamma 2$	0.274	0.209	0.206	0.217878 (11.89)***
	(11.40)***	(12.55)***	(8.29)***	
$\gamma 3$	-0.019	-0.028 (-13.69)***	-0.010	-0.029 (-10.41)***
	(-5.03)***		(-2.13)**	
$\gamma 4$	-0.021	-0.020	-0.014	-0.012
	(-6.18)***	(-8.33)***	(-3.89)**	(-3.87)***
Adjusted R^2	0.116	0.232	0.088	0.185
Joint Wald test H_0: $\gamma 3 - \gamma 4 = 0$				
$\gamma 3 - \gamma 4$	0.002	-0.008	0.004	-0.018
Chi-square	0.245	8.73	0.629	22.926
t-statistic	(0.50)	(-2.95)***	(0.79)	(-4.79)***

Tabe 2 reports the estimation results of the asymmetric volatility models, the regression results show that no matter in a market condition with high volatility or low volatility, there are significant herd behaviors in four stock markets in China. Through the joint Wald test, comparing the value of $\gamma 3$ and $\gamma 4$, except for the Shenzhen A-share market, the rest of the stock markets present a consistent phenomenon: $\gamma 3$ is significantly smaller than $\gamma 4$, which indicates that in the market with high

volatility, herding is more obvious. To a greater extent. those results is the same as the Tan et al (2008) [5]. We suggest that when the volatility in the stock market is high, this condition can more easily attract investors' attention, prompt investors to be more concerned about the actions of others and the entire market, and the result is that investors abandon their private information to follow the trend.

The next we consider the trading volume of the market portfolio as a market condition to test whether the herd behavior produces asymmetry under different conditions. We characterize trading volume as high if on day t it is greater than the previous 30-day moving average, and vice versa .

$$CSAD_t = \alpha + \gamma_1 D_t \mid R_{m,t} \mid + \gamma_2 (1 - D_t) \mid R_{m,t} \mid + \gamma_3 D_t (R_{m,t})^2 + \gamma_4 (1 - D_t)(R_{m,t})^2 + \varepsilon_t \quad (4)$$

$$D_t = \begin{cases} 1 & Volume_t \quad is \quad high \\ 0 & Volume_t \quad is \quad low \end{cases} \quad (5)$$

Tabe 3 shows that no matter in a market condition with high volatility or low volatility, there are significant herd behaviors in four stock markets in China.Through the joint wald test, this table presents that γ3 is significantly smaller than γ4 in the B-share market, which indicates that in the market with high market turnover, the herd behavior in B-share market is more obvious .However, in the A-share market, γ3 is larger than γ4, that means when the market volume is low, the behavior of the A-share market investors is more obvious, This phenomenon is contrary to the B-share. although the result is not statistically significant.

Table 3 Herding based on the asymmetry test of trading volume

	SHA	SHB	SZA	SZB
γ1	0.242 (9.92)***	0.303 (21.07)***	0.186 (7.21)***	0.282 (15.61)***
γ2	0.274 (11.40)***	0.209 (12.55)***	0.206 (8.29)***	0.217878 (11.89)***
γ3	-0.019 (-5.03)***	-0.028 (-13.69)***	-0.010 (-2.13)**	-0.029 (-10.41)***
γ4	-0.021 (-6.18)***	-0.020 (-8.33)***	-0.014 (-3.89)**	-0.012 (-3.87)***
Adjust R2	0.116	0.232	0.088	0.185
Joint Wald test H_0: γ3-γ4=0				
γ3-γ4	0.002	-0.008	0.004	-0.018
Chi-square	0.245	8.73	0.629	22.926
t-statistic	(0.50)	(-2.95)***	(0.79)	(-4.79) ***

3.3 Spurious herding and intentional herding

Yaseen and Yau (2018) suggest that herd behavior can be distinguished between spurious (informational) herding and intentional (non-information) herding in the stock market. spurious herding can be considered as an investor's reaction to changes in basic information, while intentional herding is simply a deliberate attempt to imitate someone else's investment behavior[6]. This paper uses the method proposed by Yaseen and Yau (2018) and we construct the following models:

$$CSAD_t = \alpha + \beta_1 (R_{m,t} - RF_t) + \beta_2 HML_t + \beta_3 SMB_t + \varepsilon_t \quad (6)$$

$$CSAD_{fund,t} = CSAD_t - CSAD_{nofund,t} \quad (7)$$

$$CSAD_{k,t} = \alpha + \gamma_1 R_{m,t} + \gamma_2 \mid R_{m,t} \mid + \gamma_3 (R_{m,t})^2 + \varepsilon_t \quad (8)$$

Where k in eq8 can be ‘fund’ or ‘nofund’. Eq6 distinguish whether investors respond to public information in the stock market through the Fama-French three factors. the residual ε_t as the cross-sectional absolute deviations without the effect of fundamental information. therefore we can

get the $CSAD_{nofund,t}$ to proxy intentional herding and $CSAD_{fund,t}$ to proxy spurious herding. We test the two kind of hearing by model 8.

Table 4 Analysis of spurious herding and intentional herding

	SHA	SHB	SZA	SZB
Nofund				
γ1	0.024 (3.87)***	0.003 (0.63)	0.026 (4.03)***	0.009 (1.66)*
γ2	0.278 (14.28)***	0.281 (22.16)***	0.215 (10.65)***	0.256 (17.09)***
γ3	-0.027 (-10.00)***	-0.028 (-16.15)***	-0.019 (-6.40)***	-0.023 (-10.29)***
Fund				
γ1	-0.096 (-98.58)***	-0.041 (-102.91)***	-0.099 (-100.46)***	-5.064 (-171.35)***
γ2	0.007 (2.36)**	-0.002 (-1.82)***	0.014 (4.64)***	0.0002 (0.27)
γ3	-0.001 (-1.40)	7.78E-05 (0.48)	-0.002 (-5.06)***	-0.0004 (-2.91)***

In the regression result of eq8, if γ3 is less than zero, there is a herding, otherwise there is no herding. Table4 present that the intentional herding is prominent in the A-share and B-share markets of Shanghai exchange and Shenzhen exchange. there is a spurious herding in A-share and B-share stock markets of the Shenzhen exchange, but spurious herding don't exist in the Shanghai exchange.

4. Conclusion

This paper empirically tests the herd behavior both of two stock exchange, and finds that there are herding effects in both stock markets. Based on the CCK model, this paper uses Fama-French three factors as control variables to distinguish between Spurious herding and intentional herding, we suggest that the intentional herding in Chinese stock market is obvious and Shenzhen exchange has a significant herding behavior, while the Shanghai Stock Exchange does not.

In this paper, the volatility and trading volume are consider as market conditions to test the asymmetry of the herding in the stock market. The final result suggest that there is asymmetry in the herd behavior of Chinese stock market, The B-share market has a stronger herd behavior when the volatility is high and the trading volume is large, and herding is more obvious when the volatility of the A-share market is high.

It can be seen from the conclusion that the intentional herding in Chinese stock market is significant, which indicates that investors are more willing to imitate other people's investment decisions. Chinese stock market is still in the initial stage of development, and it is necessary to strengthen investors' investment awareness and improve the information transmission system.

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