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The Herding Behavior and Financial Crisis: Evidence from Chinese ADRs

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Abstract

This paper investigates the herding behavior among Chinese American Depository Receipts (ADRs) during 1993–2008. We find the evidence of herding among Chinese ADRs in both rising and falling markets. Moreover, the herding has no significant difference in the host market (NYSE or NASDAQ), where the ADRs were traded, and the underlying markets (mainland China or Hong Kong), where the ADRs were issued. However, we find that herding occurs only among those Chinese ADRs issued during the time of Internet bubble, indicating that market timing has great effects on herding behavior, while the origin of issuers does not matter. Thus, this paper concludes that the herding behavior of Chinese ADRs supports the information-driven hypothesis, and this result has important implication on global financial crisis. This paper suggests that information-driven herding exists among Chinese ADRs. The results support our hypothesis that Chinese ADRs are dominated by sophisticated investors. To further stabilize ADR stock markets, it is imperative to improve information transparency of the underlying firms, especially those Chinese ADRs issued during the time of Internet bubble.

Keywords: Herding Behavior, Financial Crisis, Chinese ADRs

Introduction

Herding behavior in financial markets draws great interest in the 2008 financial crisis. It is important to investigate this issue because better understanding of this phenomenon might contribute to explaining the formation of financial bubbles and crisis. Moreover, it is critical for the policy makers in the sense that insufficient monitoring efforts are often blamed as one of the elements pushing forward herding behavior (Uchida and Nakagawa, 2007).

Why do investors herd in some emerging markets but not in the developed economies? There are mainly two lines of arguments attempting to address this question. One line of argument emphasizes that herding is information-driven. It argues that investors may prefer to conformity with the market consensus when information is costly (Devenow and Welch, 1996). Hence, differences in herding behavior among various stock markets are related to availability and costs of information. Consequently, market regulations on financial transparency and information disclosure are called on to eliminate herding in stock markets.

On the other hand, if herding is largely driven by a psychological desire to copy the actions of others, characteristics of investors might have significant impact on the existence of herding. For instance, Nofsinger and Sias (1999) find that amateurs tend to herd more frequently than professionals, which implies that less knowledge of financial markets might lead to higher tendencies of irrational behavior. Investors in the U.S. stock market are arguably more sophisticated than those in the Chinese market, largely due to a long history of financial markets. Thus, alternatively, it is possible that the difference in investor characteristics explains the herding behavior between the U.S. and Chinese stock markets.

Although it is difficult to differentiate between information-driven and imitation-driven herding, it seems to be an increasing consensus that herding behavior can be largely ignored in the U.S. stock markets (Chang et al., 2000), whereas herding occurs in less developed financial markets including the Chinese stock markets (Demirer and Kutan, 2006; Lin et al., 2008). However, there is still a question under debate because it might lead to the same consequence that herding is rare in the U.S. stock market, but common in less-developed countries like the Chinese stock market. Nevertheless, the fact that Chinese American Depositary Receipts (ADRs) with underlying shares either listed in mainland or Hong Kong stock

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exchange provides an interesting setting to address this issue. If Chinese ADRs exhibit herding behavior in the U.S. markets, informational asymmetry and uncertainty of the firms might significantly attribute to such a behavior. On the contrary, if Chinese ADRs do not exhibit herding behavior, which are just like other stocks traded in the U.S. market, experienced investors might be the major driving force in preventing from herding and thus stabilizing the financial markets.

This paper contributes to the existing literature in the following ways: first, it identifies Chinese ADRs as an exceptional example of the U.S. stock market in perspective of herding behavior. This adds to the behavior research on the U.S. stock market. Second, we add to the ongoing debate of causes of herding behavior by studying Chinese ADRs that are traded among relatively matured investors but suffer relatively inadequate information disclosure from the underlying firms. Our research supports the view that herding is more likely to be information-driven. Hence, improvement in corporate governance and information disclosure is essential to lessen herding behavior and, in turn, stabilize financial market. Furthermore, it reveals that Chinese stock market cannot expect to evolve out of herding behavior solely relying on investors gaining more knowledge of financial markets in the future. Third, we find that herding occurs only among those Chinese ADRs issued during the time of Internet bubble, implying that market timing affects herding behavior.

The empirical results support the evidence of the existence of herding behavior among Chinese ADRs, indicating that herding behavior fails to disappear in the presence of sophisticated investors; it implies that herding among Chinese stock markets might be information-driven. Moreover, we find that herding among Chinese ADRs is identical on the host markets (no mater it is NYSE or NASDAQ) or on different underlying market (whether it is mainland China or Hong Kong). Finally, we find that herding only occurs among those Chinese ADRs issued during the time of dot-com bubble, suggesting the presence of timing effects on heading.

Data and Methodology

In this paper, ADR is defined as a negotiable certificate denominated in the U.S. dollars that represents a specific amount of shares of a foreign company. We retrieve all the Chinese ADRs data from the JPMorgan's ADR web site (www.adr.com). Initially, we obtain a total of 84 ADRs on both NYSE and NASDAQ. We then collect data on stock prices, market returns, and industry code from the Center for Research in Security Prices (CRSP) over the sample period January 1, 1993–December 31, 2008. Further, we exclude those ADRs that have traded less than 2 years and those without complete market data over the sample period, yielding 43 firms and 65,330 daily observations. The stock return for each individual firm is $R_t = 100*(\log(P_t) - \log(p_{t-1}))$.

Herd behavior is defined as an evident intent by investors to suppress their private information, and follow the behavior of other investors instead (Bikhchandani and Sharma, 2000). The method to detect the herding behavior is following the approaches of Chang et al. (2000). The specification of herding is as follows:

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

$$CSAD_t = \frac{1}{N} \sum_{i=1}^{N} \left| R_{i,t} - R_{m,t} \right| \quad (2)$$

where $CSAD_t$ is cross-sectional absolute deviation (CSAD) in the stock market at time t, a measure of return dispersion. $R_{m,t}$ is the equal-weighted average daily stock return. $R_{i,t}$ denotes Chinese ADRs' daily stock returns. A nonlinear market return, $R_{m,t}^2$, is included in the test equation, and a significantly negative coefficient γ_2 in the test would be an indication of presence of herding behavior.

Rational asset pricing models depend on a linear relation between the return dispersion of individual stocks and the return on the market portfolio. If absolute value of the market return increases, the dispersion in individual asset returns shall increase as well. During periods of extreme market movements, investors may exhibit herding behavior, that is, trade in a more homogeneous way, such a behavior may increase the correlation among asset returns, and in turn dispersion among returns will not increase at a proportional rate with the market return. Following this logic, a nonlinear coefficient of market return can identify the occurrence of herding behavior.

We also test asymmetric effects of market return on herding behavior. We re-estimate herding regression, respectively, for positive and negative market returns. The regression specifications are as follows:

$$CSAD_t^{UP} = \alpha + \gamma_1^{UP}\left|R_{m,t}^{UP}\right| + \gamma_2^{UP}(R_{m,t}^{UP})^2 + \varepsilon_t, \quad if \ \ R_{m,t} > 0 \quad (3)$$

$$CSAD_t^{DOWN} = \alpha + \gamma_1^{DOWN}\left|R_{m,t}^{DOWN}\right| + \gamma_2^{DOWN}(R_{m,t}^{DOWN})^2 + \varepsilon_t, if \ R_{m,t} < 0 \quad (4)$$

where $R_{m,t}^{\ UP}$ is the equal-weighted portfolio return at time t when the market is rising, and $CSAD_t^{UP}$ is the return dispersion at time t corresponding to $R_{m,t}^{\ UP}$. Similarly, $R_{m,t}^{\ down}$ is the value weighted portfolio return at time t during the down market and $CSAD_t^{down}$ is the return dispersion at time t corresponding to $R_{m,t}^{\ down}$.

Empirical Results

Descriptive Statistics

Table 1 reports the summary statistics of cross-sectional absolute deviations (CSADs). Among the total 65,330 observations, 37,009 observations are classified into rising market and 28,321 observations are classified into falling market, based on equal value index movement. CSAD overall refers to the cross-sectional deviation among Chinese ADRs throughout the whole sample period. CSAD UP refers to the cross-sectional deviation among Chinese ADRs only if $R_{m,t} > 0$; similarly, CSAD DOWN refers to the cross-sectional deviation among Chinese ADRs only if $R_{m,t} < 0$. Here, we use equal market portfolio return to distinguish between bull and bear markets. We test all empirical results for robustness with value weighted market portfolio. The corresponding results are very similar. Specifically, the overall dispersion measure in terms of the average $CSAD_t$ is 1.105; it is slightly greater in down market (1.108) than that in up market (1.103). This evidence is consistent with that of Chang et al. (2000), in which rising markets have larger average values of return deviations than falling market. The statistics also show that CSAD in rising market has slightly higher standard deviation (0.336) than that in falling market (0.329), implying the rising market has higher volatility of cross-sectional absolute deviations.

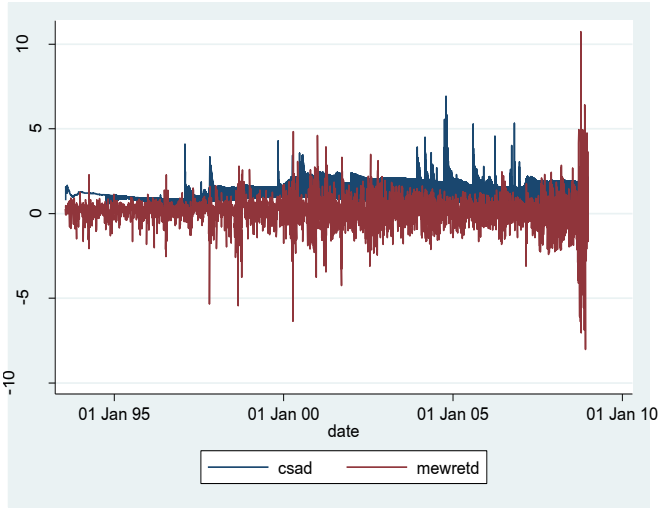
Table 1 shows the descriptive statistics of daily equally weighted Cross-Sectional Absolute Deviations ($CSAD_t$) for Chinese ADRs. "CSAD overall" refers to entire sample of CSAD; "CSAD UP" refers to the CSAD when market is rising; "CSAD DOWN" refers to the CSAD when market is falling. The daily data range from 1/1/1993 to 12/31/2008.

Table 1: Descriptive Statistics of Cross-Sectional Absolute Deviations

Statistics	Mean	St. Dev	Min	Max	No.
CSAD overall	1.105	0.333	0.006	6.92	65330
CSAD UP	1.103	0.336	0.006	6.606	37009
CSAD DOWN	1.108	0.329	0.006	6.921	28321

Evidence of Herding and Asymmetric Effects of Market Return

Fig. 1 depicts the CSAD for Chinese ADRs and market movements in terms of percentage change of market return. A rough observation leads us to deduce that Chinese ADRs may have a presence of herding behavior. CSAD for Chinese ADRs peaks around the year 2008 when financial crisis occurs. As expected, CSAD is evident during the time of extreme stock market movement and is relatively trivial during the smooth market periods.



Note: $CSAD_t$ is daily equally weighted Cross-Sectional Absolute Deviations, mewretd is calculated as 100*percentage change of market return to be comparable to $CSAD_t$. The daily data ranges from 1/1/1993 to 12/31/2008.

Fig. 1: CSAD Overall from 1/1/1993 to 12/31/2008

In the next step, we estimate the CSAD based on Eqs. (1) and (2) to determine whether Chinese ADRs exhibit herding behavior. Panel A of Table 2 reports the results of estimating the herding regression on overall market, in which a significantly negative value on the coefficient γ_2 implies the occurrence of herding. The estimate of γ_2 based on daily data on Chinese ADRs in the U.S. stock markets is not significantly negative at any conventional level. It suggests that herding behavior does not exist among Chinese ADRs in terms of overall market movement.

Panel B of Table 2 considers the results of estimating the herding regression when market is rising. It shows that herding is most significant in rising market as evidenced by negatively significant estimate of γ_2 about –25.725 (statistically significant at 1% level). Similarly, Panel C of Table 2 reports the results of estimating the herding regression when market is falling, that is, return of market portfolio is negative. It shows that herding is significant in declining market. The magnitude of herding is large with the coefficient of γ_2 about –9.467. This coefficient is statistically significant at 0.5% level and the coefficient is about one third of that in the rising market.

It concludes that herding behavior among Chinese ADRs is profound in both rising markets and falling markets, implying that herding contributes to driving the Chinese ADRs stock returns away from the fundamentals. Furthermore, those results reveal that informational asymmetry and uncertainty of firms might be significant.

Table 2: Herding and Asymmetric Effects of Market Return

Panel A: Overall Regression Results			
CSAD	α	γ_1	γ_2
Coef.	1.105	0.223	1.708
P>t	(0.001)***	(0.001)***	(0.261)
Panel B: Regression Results when Market Rises			
Coef.	1.0910	2.1716	-25.725
P>t	(0.001)***	(0.001)***	(0.001)***
Panel C: Regression Results when Market Declines			
Coef.	1.105	-0.509	-9.467
P>t	(0.001)***	(0.046)**	(0.041)**

Table 2 reports results of the following regression for Chinese ADRs: $CSAD_t = \alpha + \gamma_1|R_{m,t}| + \gamma_2(R_{m,t})^2 + \varepsilon_t$, where $R_{m,t}$ is the equally weighted portfolio return at time t. $CSAD_t$ is the equally weighted cross-sectional absolute deviation. The sample period is from 1/1/1993 to 12/31/2008. Panel A reports results of regression for Chinese ADRs in entire sample period; panel B shows the results of herding when market is rising; panel C shows the results of herding when market is falling. The p-values are in parentheses. ***, **, and* denote significance at the 1, 5, and 10% levels, respectively.

Herding Behavior on Different Host Markets and from Different Underlying Markets

Panel A of Table 3 presents the results of the herding of Chinese ADRs segmented by listing on the NYSE or NASDAQ to capture the effects of host markets. Results show γ_2 is statistically significant in both exchanges. This result suggests that there is no significant difference in the impact of host markets on Chinese ADRs in terms of herding.

Panel B compares the herding behavior of Chinese ADRs issued from mainland China and those from Hong Kong. The herding behavior between the two samples is not obvious. The γ_2 is statistically significant at any conventional level with higher coefficient value of γ_2 for those issued from mainland China. It is about 1.5 times larger than those from Hong Kong. In sum, we conclude that the origin of issuer does not matter in herding.

Table 3: Herding Behavior on Different Host Markets and from Different Underlying Markets

Panel A: Overall Regression Results on NYSE Exchange			
CSAD	α	γ1	γ_2
Coef.	0.989	0.135	13.346
T	1328.46	2.09	8.53
P>t	(0.001)***	(0.037)**	(0.001)***
Panel B: Overall Regression Results on NASDAQ Exchange			
Coef.	1.283	0.339	-9.686
T	765.48	2.6	-3.44
P>t	(0.001)***	(0.009)***	(0.001)***
Panel C: Overall Regression Results on Underlying Stocks from Mainland China			
Coef.	0.9893	0.1349	13.346
P>t	(0.001)***	(0.037)**	(0.001)***
Panel D: Overall Regression Results on Underlying Stocks from Hong Kong			
Coef.	1.2833	0.339	-9.686
P>t	(0.001)***	(0.009)***	(0.001)***

Table 3 reports the following regression results for Chinese ADRs: $CSAD_t = \alpha + \gamma_1|R_{m,t}| + \gamma_2(R_{m,t})^2 + \varepsilon_t$, where $R_{m,t}$ is the equally weighted portfolio return at time t. $CSAD_t$ is the equally weighted cross-sectional

absolute deviation. The sample period is from 1/1/1993 to 12/31/2008. Panel A reports results of regression for Chinese ADRs listed on NYSE exchange; panel B shows the results of regression for Chinese ADRs listed on NASDAQ; panel C reports results of regression for Chinese ADRs issued from Mainland China; panel D shows the results of regression for Chinese ADRs issued from Hong Kong. The *p*-values are in parentheses. ***, **, and * denote significance at the 1, 5, and 10% levels, respectively.

Impact of Market Timing on Herding Behavior

Table 4 captures the effects of stock market timing on herding of Chinese ADRs issued during the time of Internet bubble and the time period after that. Panel A shows that γ_2 is significant at 1% with a coefficient of 7.131. This result suggests that there is significant herding behavior among the Chinese ADRs issued during the time of dot-com bubble. However, herding does not occur among those ADRs listed after the dot-com bubble period. This difference suggests the presence of market-timing effects on herding.

Table 4: Impact of Market Timing on Herding Among Chinese ADRs

Panel A: Listed During Internet Bubble			
csad	α	γ_1	γ_2
Coef.	1.0848	0.1807	7.131
P>t	(0.001)***	(0.022)**	(0.001)***
Panel B: Listed after Internet Bubble			
csad	α	γ_1	γ_2
Coef.	1.1445	0.284	-2.953
P>t	(0.001)***	(0.018)**	(0.231)

Table 4 reports results of the following regression for Chinese ADRs: $CSAD_t = \alpha + \gamma_1|R_{m,t}| + \gamma_2(R_{m,t})^2 + \varepsilon_t$, where $R_{m,t}$ is the equally weighted portfolio return at time *t*. $CSAD_t$ is the equally weighted cross-sectional absolute deviation. The sample period is from 1/1/1993 to 12/31/2008. Panel A reports results of regression for Chinese ADRs issued between 1/1/1993 and 12/31/2002; panel B shows the results of regression for Chinese ADRs issued between 1/1/2003 and 12/31/2006. The *p*-values are in parentheses. ***, **, and * denote significance at the 1, 5, and 10% levels, respectively.

Conclusions

This paper suggests that information-driven herding exists among Chinese ADRs. The results support our hypothesis that Chinese ADRs are dominated by sophisticated investors, suggesting that experienced investors cannot prevent herding from occurring. Therefore, herding is more likely to be information-driven. In addition, based on daily data from 1993 to 2008, the empirical results reveal that investor herding characterizes Chinese ADRs and that the magnitude of herding is larger in up market than in down market. Moreover, we find herding among Chinese ADRs is indifferent on the host market (whether NYSE or NASDAQ) or on different underlying market (whether mainland China or Hong Kong). Finally, we find that the Chinese ADRs that were issued during the time of Internet bubble herd persistently, implying that market timing effects involves in the herding behavior. To further stabilize stock markets, we shall improve information transparency of the underlying firms, especially those Chinese ADRs issued during the time of Internet bubble.

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