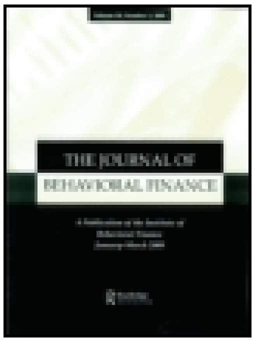

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What Explains Herd Behavior in the Chinese Stock Market?

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ABSTRACT
This article examines the causes of herd behavior in the Chinese stock market. Using the nonlinear model of Chang, Cheng, and Khorana [2000], the authors of this article find robust evidence of herding in both the up and down markets. They contribute to the existing literature by exploring the underlying reasons for herding in China. It is shown that analyst recommendation, short-term investor horizon, and risk are the principal causes of herding. However, the authors cannot find evidence that relates herding to firm size, nor can they detect significant differences in herding between state-owned enterprises and non–state-owned enterprises.

KEYWORDS
A-share market; Herd behavior; Return dispersion; Systemic risk

Introduction

Herding behavior in stock markets has been the subject of considerable academic attention over the past 2 decades. Some studies regard herding as a result of rational incentives (Shleifer and Summers [1990], Chari and Kehoe [2004], Calvo and Mendoza [2000]), whereas others believe that it results from the cognitive bias of investors (Devenow and Welch [1996], Lux [1995]). Herding can be spurious or intentional; the former refers to a clustering of investment decisions owing to similar underlying information environment, whereas the latter is a situation where investors follow each other's trading decisions regardless of their own beliefs. Herding is more ubiquitous in emerging markets. Most extant studies have found significant evidence in favor of herding in developing countries (Chang et al. [2000], Chiang and Zheng [2010]). However, few studies have identified whether certain market microstructure or stock characteristics might foment herding among investors. In this article we aim to fill the gap by examining the herding behavior in the Chinese stock market with a special focus on the role of government intervention, information environment, investor horizon, and the level of systematic risk on herding. The case of the Chinese stock market is of interest because of its influence as the largest emerging stock market in the world. As of 2012, the total market capitalization of the Chinese stock market was over US$3,740 billion. Moreover, the market is unique in that it is dominated in number by individual investors who have little professional knowledge and limited access to veracious information. As a result, they might be more likely to follow the trading decisions of institutional investors—a role that is increasingly important in China. Since 2006, the number of domestic institutional investors in China and the value of assets under their management have soared. More recently, an increasing number of foreign institutional investors have also initiated investments in the state through the qualified foreign institutional investors scheme.

Previous academic evidence of herd behavior in China is mixed. Although Demirer and Kutan [2006] detected no evidence of herd behavior, Tan et al. [2008] found herding to be prevalent in both the A-share and the B-share markets. To the best of our knowledge, little effort has been made to investigate (a) the underlying reasons for herding and (b) stock characteristics that generate a higher probability of herding. In this article, we will address the aforementioned questions and provide a comprehensive analysis of herding behavior in the Chinese stock market. Following the methodology of Chang, Cheng, and Khorana [2000], we found significant evidence in favor of herding in the Chinese A-share market during 2000 and 2011.[1] Consistent with the view that market participants tend to exhibit herd behavior during market slumps, the evidence of herding in our sample is more pronounced in the down market. Subsample analyses show that our results are robust.

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In addition, we also uncover the characteristics of stocks that are more likely to be herded. First, in contrasts to the conventional view that government intervention is an important perpetuator for herding, no significant difference in herding between state-owned enterprises (SOE) and non-SOEs is detected. Second, it is found that the number of analyst following affects herding. In the subsample where the number of analyst following is above the median, we find significant evidence of herding, whereas no herding is detected in other subsamples. Third, firm size and the dispersion in the analyst forecast—which are also proxies for information environment—are not important sources of herding. In subsamples partitioned by size and forecast dispersion, significant evidence of herding is detected. In addition, we also investigate the influence of speculative investors on herding. Speculation is proxied by daily turnover rate, which is measured by the trading volume scaled by shares outstanding. Interestingly, we find that stocks in the subsample with highest daily turnover exhibit significant evidence of herding, which is consistent with the view that speculation contributes to herd behavior. Finally, we find evidence that herding is more pronounced in risky stocks.

The rest of the article is organized as follows. The second section reviews the herding literature. In the third section, we provide the methodological details and data description. The fourth and fifth sections present the empirical results. The sixth section concludes the article.

Related literature

There exists an exhaustive literature on the topic of herding. One scholarly camp argues that herding arises from investors' psychological bias. For example, Devenow and Welch [1996] and Lux [1995] argued that herding occurs when investors suppress their prior beliefs and blindly follow others' trading strategies. Another strand of the literature contends that herding can also occur among rational market participants. An information-related herding theory states that the actions of informed traders might reveal inside information, which induces outsiders to follow informed traders' investment strategy (Shleifer and Summers [1990], Chari and Kehoe [2004], Calvo and Mendoza [2000]). Moreover, the principal-agent problem in the asset management industry might also cause herding. As suggested by Scharfstein and Stein [1990] and Rajan [1994], fund managers of institutional investors care about their performance relative to their peers, hence they have incentive to infer the information content from their peers' investment strategies and mimic those strategies. In this way, they will perform on par with their counterparts in other mutual funds. Consequently, the rational behavior of fund managers leads to a seemingly irrational market phenomenon of herding.

A variety of empirical methodologies have been employed to examine herd behavior. Christie and Huang [1995], for instance, studied cross-sectional standard deviations in the U.S. equity market. The underlying intuition behind their method is that if market participants suppress their own predictions about asset prices during periods of large market movements and base their investment decisions only on market consensus, individual asset returns will not diverge substantially from the overall market return. However, rational asset pricing model would predict the dispersion of individual stock returns to increase with market return. Thus, during large market swings, a reduction of cross-sectional standard deviations leads to the existence of herd behavior. The results of Christie and Huang [1995] do not suggest evidence of herding in the U.S. stock market.

Chang et al. [2000] proposed a variant of the methodology used by Christie and Huang [1995]. They calculated the cross-sectional absolute deviation (CSAD) of stock returns, which is less subject to the influence of outliers than the cross-sectional standard deviation of stock returns. The implication from a rational asset pricing model indicates that there is a linear and positive relation between CSAD and market return. The evidence that CSAD increases (decreases) with market return with a decreasing (increasing) speed lends support to herd behavior. Chang et al. [2000] documented significant evidence of herding in the stock markets of South Korea and Taiwan. Partial evidence of herding in the Japanese stock market is also found, but no evidence of herding is found in the U.S. or Hong Kong markets. Hwang and Salmon [2004] employ a different testing methodology based on cross-sectional variability of factor sensitivities. Their study confirms that herd activities exist in South Korea. Lin and Swanson [2003] found no evidence that foreign investors herd in the Taiwanese market using the cross-sectional standard deviation based methodology. Zhou and Lai [2009] discovered that herd behavior in Hong Kong tends to be more prevalent in small stocks and that investors are more likely to herd when selling rather than buying stocks. Chiang and Zheng [2010] examined daily return data for 18 countries and document herd behavior of stock markets in developed countries (except in the United States) and developing countries alike.[2]

Methodology and data

We use a simple framework, following Chang et al. [2000], to explain why our empirical method can capture herd behaviors. In a rational market without any friction, capital asset pricing model (CAPM) indicates that the expected return of individual stock can be expressed as follows:

$$E(R_{it}) = \beta_0 + \beta_i E(R_{mt} - \beta_0),$$

where R_i is the individual stock return at day t, $R_{mt}$is the market portfolio return at day t, β_0 is the return on the zero-beta portfolio, and β_i is individual stock's systematic risk.

The absolute value of the deviation of individual stock expected return from market return is:

$$1 \mid * \mid E(R_{mt} - \beta_0) \mid, \mid E(R_{it}) - R_{mt} \mid = \mid \beta_i -$$

where $E(R_{mt}) = \beta_0 + 1 * E(R_{mt} - \beta_0)$. The average cross-sectional absolute value of the deviation of all individual stocks (AAVD) is simply

$$AAVD_t = \frac{1}{N} * \sum\nolimits_{i=1}^{N} \mid E(R_{it}) - R_{mt} \mid$$
$$= \frac{1}{N} * \sum\nolimits_{i=1}^{N} \mid \beta_i - 1 \mid * \mid E(R_{mt} - \beta_0) \mid$$

From the previous equation, we can see that the average absolute value of deviation is a positive and linear function of absolute value of market return.

$$\frac{\partial AAVD_t}{\partial \mid E(R_{mt}) \mid} = \frac{1}{N} * \sum\nolimits_{i=1}^{N} \mid \beta_i - 1 \mid > 0,$$
$$\frac{\partial^2 AAVD_t}{\partial E(R_{mt})^2} = 0$$

Any nonlinear relation between AAVD and market return indicates investor irrationality or market friction. As a special case of irrational trading behavior, investors following a herding trading strategy suppress their belief and follow the market, which decreases individual stock's deviation from market return. In case of volatile market, the herding effect dominates the positive effect arising from rational trading strategy, suggesting a negative association between AAVD and $E(R_{mt})$. Combing the 2 effects together, we expect that AAVD first increases and then decreases with market return. Hence, we use the negative correlation between AAVD and $E(R_{mt})^2$ as evidence of herd behavior.

To empirically test herd behavior in the Chinese stock market, we again follow Chang et al. [2000] and employ a nonlinear regression specification to examine the relation between the level of equity return dispersion and the overall market return. The return dispersion measure is cross-sectional absolute deviation of returns (CSAD), which is formulated as:

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

where N is the number of firms in the aggregate market portfolio, $R_{i,t}$ is the observed stock return for firm i on day t and $R_{m,t}$ is the return of market portfolio at time t. The CSAD is a proxy for AAVD under the assumption that realized return is a good proxy for expected return and it measures the degree to which individual stock return deviates from market consensus.

The rational asset-pricing model implies a linear relation between the dispersion in individual asset returns and the market return; dispersion in individual asset returns arises with the absolute value of the market return under normal conditions. However, if market participants tend to follow the consensus of the market and trade in the same direction during periods of market stress, this herd behavior is likely to increase the correlation among asset returns, which leads to a nonlinear relation between CSAD and market return. Therefore, a testing methodology based on a general quadratic relationship between CSAD and market return of the form is proposed as follows:

$$CSAD_t = \alpha + \gamma_1 \mid R_{mt} \mid + \gamma_2 (R_{mt})^2 + \varepsilon_t \quad (2)$$

The nonlinear term is captured by γ_2. In the presence of herding, the nonlinear coefficient γ_2 will be significantly negative, indicating that in times of a highly volatile market, equity return dispersion decreases with the absolute return because investors tend to suppress their own opinions and follow others' trading strategy. In addition, it is possible that the degree of herding may be asymmetric in the up and down markets. Therefore, the following models for up and down markets are estimated in Equations 3 and 4, respectively:

$$CSAD_t{}^{UP} = \alpha + \gamma_1{}^{UP} \mid R_{mt}{}^{UP} \mid + \gamma_2 (R_{mt}{}^{UP})^2 + \varepsilon_t \quad (3)$$

$$CSAD_t{}^{DOWN} = \alpha + \gamma_1{}^{DOWN} \mid R_{mt}{}^{DOWN} \mid + \gamma_2 (R_{mt}{}^{DOWN})^2 + \varepsilon_t \quad (4)$$

where $CSAD_t{}^{UP}(CSAD_t{}^{DOWN})$ is the average deviation of individual stock return to the market return when the market return is positive (negative).

The stock price data of the entire population of A-share firms and market return data of the Shenzhen and Shanghai market are obtained from the China Stock Market Accounting Research (CSMAR) database. Daily returns are examined. The sample period ranges from January 2000 to December 2011.

The summary statistics are reported in Table 1. The time series average value weighted market return over the whole sample period is 0.0%, with a standard deviation of 1.8%, ranging from −9.1% to 9.9%. As for CSAD, the mean is 1.7% and its standard deviation is 0.6%, which is similar to the statistics in Tan et al. [2008]. Figure 1 depicts the time series pattern of CSAD. Note that large investor dispersion mostly occurs in 2007 and 2008.

Empirical results

Nonlinearity in return dispersions and market return

Table 2 presents the estimation results of the following model:

$$CSAD_t = \alpha + \gamma_1 \mid R_{mt} \mid + \gamma_2 (R_{mt})^2 + \varepsilon_t \quad (5)$$

The model is also estimated separately for subsamples in the up and down markets. To make a direct comparison of the coefficients of the linear term in the up and down markets, the absolute value—instead of the raw value—of equally weighted market return is used in the model estimation. The intercept term represents the average level of equity dispersions when the market return is zero and is 1.37% for the whole sample. Compared with the down market, where the intercept is also 1.37%, the estimated value of the intercept term in the up market is 1.39%. The difference is not significant.

The coefficients of the absolute market return (γ_1) are significantly positive in the whole sample regression as well as the up and down market regressions. This is consistent with the prediction of CAPM, which states that return dispersions increase linearly with absolute market return, discussed briefly in the Methodology and Data section. The rate of increase is 0.23 and 0.34 in the up and down markets, respectively. Consistent to the findings of McQueen, Pinegar, and Thorley [1996], the stock market in China reacts faster to bad news than good news. As a result, the average of CSAD is larger in good times due to the asymmetric reaction to good and bad news.

More importantly, the nonlinear term coefficients (γ_2) are negative and significant in all 3 regressions, providing indirect evidence for herd behavior in the Chinese stock market. As discussed in the Methodology and Data section, a negative correlation between CSAD and quartic term of market return suggests that individual investors suppress their own belief and follow the market,

Table 1. Summary statistics.

Variable	Mean	Std.Dev.	Min	Max
Panel A: Whole-Sample Statistics				
Market_Return	0.0	1.8	−9.1	9.9
CSAD	1.7	0.6	0.4	6.0
State	0.4	0.5	0.0	1.0
Beta	1.1	0.3	−4.7	10.7
Analyst	4.5	8.1	0.0	79.0
Dispersion	0.0	0.0	−1.2	0.0
Size	4168110.0	27900000.0	23130.0	2060000000.0
Turnover	24.7	34.5	0.0	2686.6
Panel B: Subsample Split by Government Intervention				
SOE	1.6984	0.5966	0.3859	6.1064
non-SOE	1.6938	0.6628	0.4219	8.5203
Panel C: Subsample Split by Information Environment				
Macro-Information Environment				
Low Beta	1.6779	0.7030	0.5750	9.3747
High Beta	1.7788	0.7337	0.2007	8.9691
Firm-Specific Information Environment				
Few Analysts	1.7970	0.7661	0.6473	18.5991
More Analysts	1.7074	0.5933	0.6057	5.2141
More Dispersion	1.6563	0.6079	0.2041	8.6875
Less Dispersion	1.8314	0.7688	0.5488	10.0786
Small Size	1.7541	0.7345	0.4992	9.1110
Large Size	1.5577	0.7238	0.1201	21.6996
Panel D: Subsample Split by Speculation				
Low Turnover	1.1770	0.6915	0.3450	8.5775
High Turnover	2.9181	1.5319	0.3260	43.1503

Note. This table reports the descriptive statistics of market return and proxies for herding. The sample is all A-share stocks in China during 2000 and 2011. *Market_Return* is the value-weighted market return. *CSAD* is defined in the Methodology and Data section. *State* is a dummy variable indicating whether the listed firm's ultimate owner is the government. *Beta* is the coefficient on market model from the 30-day rolling window estimation of the market model. *Analyst* is the number of analysts following. *Dispersion* is the standard deviation of analyst earnings forecast. *Size* is market capitalization. *Turnover* is the ratio of trading volume to total tradable shares outstanding.

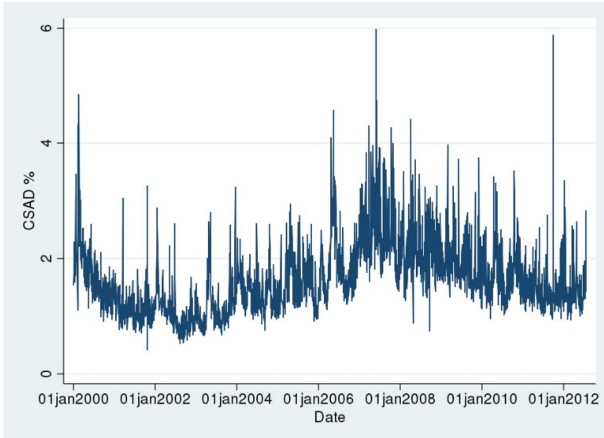

Figure 1. Cross-sectional absolute deviation (CSAD) over the sample period. This figure depicts the CSAD over the sample period. CSAD is defined in the Related Literature section.

which in turn leads to cross-sectional dispersion reacting to absolute market return at a decreasing rate. Our evidence is consistent with that of Chiang and Zheng [2010], who also documented evidence of herding in both the up market and down market. However, we do not know whether herding is more prevalent when market is booming or slumping because the nonlinear term coefficients are of similar magnitude and significance in both up and down markets.

To gain a vivid picture of the relation between CSAD and market return, we depict the estimation results in Figure 2. Figure 2 shows a hump-shaped relation between CSAD and market return. The turning point for the up market is 4.65% whereas it is 5.09% for the down market. The speed of increase (decrease) before (after) reaching the turning point is also faster in the up market than that in the down market. In other words, investors show a lower threshold to suppress their own opinions in the up market. Note that in the presence of herding, the relative degree of herding is larger in the up market. However, such difference is not significant.

Table 2. Regression result.

Panel A: Whole Sample			
Variable	(1) Full Sample	(2) Up Market	(3) Down Market
$\|R_{mt}\|$	0.2933***	0.2323***	0.3361***
	(0.024)	(0.025)	(0.033)
R^2_{mt}	−0.0253***	−0.0285***	−0.0200***
	(0.004)	(0.003)	(0.005)
Constant	1.3692***	1.3907***	1.3665***
	(0.027)	(0.030)	(0.035)
Observations	2,901	1,568	1,333
Panel B: Crisis Period			
Variable	Oct 2007-Oct2008	Jan2000-Sep2007	Oct2008-Dec2011
$\|R_{mt}\|$	0.1513***	0.2780***	0.1961***
	(0.056)	(0.042)	(0.032)
R^2_{mt}	−0.0201***	−0.0163**	−0.0167***
	(0.007)	(0.008)	(0.006)
Constant	2.0913***	1.3919***	1.6504***
	(0.091)	(0.045)	(0.038)
Observations	261	1,149	1,036

Note. Panel A presents the regression results (all A shares) for $CSAD_t = \alpha + \gamma_1 \mid R_{mt} \mid + \gamma_2 R_{mt}{}^2 + \varepsilon_t$ for up market and down market, respectively. Panel B examines the effect of extreme market condition on herding. From October 2007 to October 2008, the Chinese stock market drops dramatically. The Newey-West (Newey and West [1987]) heteroscedasticity consistent standard errors are reported in parentheses. ** and *** indicate significance at the 5% and 1% levels, respectively.

Robustness check

As shown in Figure 1, the stock return dispersion is more volatile and relatively large during 2007, when the stock market experiences a dramatic boom followed by a rapid slump. To investigate whether herd behavior is still prevalent in such extreme market conditions, we examine the herd behavior during October 2007 and October 2008.[3] In October of 2007, the A-share market reached its peak with Shanghai Composite Index of 6124 and an average price-earnings ratio of 50. However, after that the stock market started to fall swiftly, plummeting towards the bottom around October 2008, where the Shanghai Composite Index was 1664. This period is therefore widely accepted as an A-share stock market crisis. It is intriguing whether investors will change their behavior in times of crises.

The model specification is the same as before. The results are reported in panel B of Table 2. In column 1, we report the estimation results in the crisis period, October 2007 to October 2008. The coefficient of the squared market return (γ_2) is negative and significant, which indicates the presence of herd behavior in the

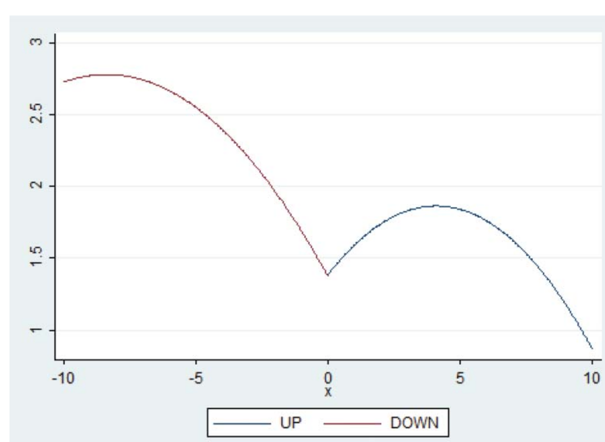

Figure 2. Herding in the up or down market. This figure depicts the relation between cross-sectional absolute deviation (CSAD) and market return in the up market and down market respectively. The parameters are based on regression results reported in Table 2. The horizontal axis is the market return and vertical axis represents CSAD.

crisis period. Furthermore, we also investigate the herd behavior in our sample period separate from the crisis period. The results are reported in columns 2 and 3. Our results show that herd behavior is still present before October 2007 and after 2008. It should be noted that the coefficient of the squared market return (γ_2) is larger in the crisis period than the normal period. This parallels Chiang and Zheng's [2010] assertion that financial crisis, to some extent, contributes to the intensification of herd behavior.

Determinants of herding

Apart from testing the presence of herd behavior in the market, it is also important to explore the causes behind herd behavior. In this article, we will consider market microstructure and firm characteristics as possible triggers or enablers of herd behavior. The 4 factors we examine here are government intervention, informational environment, speculation, and risk.

Government intervention

First, we identify government intervention as a probable cause of herding, especially as the Chinese stock market is highly regulated. A number of regulations, such as IPO or SEO verification, enable the regulatory authority to keep the capital market under tight control. Moreover, more than half of the listed firms are SOEs. These enterprises must report to the State-owned Assets Supervision and Administration Commission and follow strict government guidelines in their operation. Hence, government policies and regulatory measures can easily distort investor sentiment in China. To analyze the impact of governmental intervention on herd behavior, we examine whether herding is more pronounced in SOEs. We define whether a listed firm is a SOE based on the ultimate controlling shareholder. If the ultimate controlling shareholder is the central government or the local government or public institutions, the firm is considered a SOE. We obtain the shareholder information from CSMAR, merging our daily stock return with the annual ownership information. CSAD based on SOEs and non-SOEs is calculated using the same formula defined previously; we then use the same model specification to detect herd behavior in SOEs and non-SOEs, respectively. The results are reported in Table 3.

Observe from Table 3 that the coefficients of nonlinear term of market return are always significantly negative. The magnitudes are also similar: −0.0191 and −0.0187 for SOEs and non-SOEs, respectively. Both are significant at the 1% level. Even if we vary the nonlinear effect in the up and down markets, we still cannot find any significant difference between SOEs and non-SOEs in the nonlinear term, regardless of market conditions. Hence, we cannot conclude that government intervention gives rise to herd behavior.

Table 3. Regression result (subsample split by state ownership).

Panel A: SOE

Variable	(1) SOE Full Sample	(2) SOE Up Market	(3) SOE Down Market
$\lvert R_{mt}\rvert$	0.2475***	0.1738***	0.2991***
	(0.025)	(0.035)	(0.035)
R^2_{mt}	−0.0191***	−0.0229***	−0.0140**
	(0.004)	(0.007)	(0.006)
Constant	1.4463***	1.4656***	1.4574***
	(0.030)	(0.035)	(0.040)
Observations	2,185	1,187	998

Panel B: Non-SOE

Variable	Non-SOE Full Sample	Non-SOE Up Market	Non-SOE Down Market
|Rmt|	0.2470***	0.1818***	0.2947***
	(0.026)	(0.037)	(0.037)
R^2_{mt}	−0.0187***	−0.0241***	−0.0131**
	(0.004)	(0.007)	(0.007)
Constant	1.5513***	1.5574***	1.5748***
	(0.032)	(0.036)	(0.042)
Observations	2,185	1,187	998

Note. This table presents the regression results (all A shares) for $CSAD_t = \alpha + \gamma_1 \mid R_{mt} \mid + \gamma_2 R_{mt}{}^2 + \varepsilon_t$ for up market and down market respectively. In panel A, the dependent variable CSAD is calculated by SOE firms, whereas in panel B it is calculated based on non-SOE firms. The Newey-West heteroscedasticity consistent standard errors are reported in parentheses. ** and *** indicate significance at the 5% and 1% levels, respectively.

Information environment

In this subsection, we investigate how the information environment affects herd behavior. The paucity of reliable and timely information, upon which decisions by the investor are made, is one of the primary reasons for herd behavior. Without a credible information source, investors generally follow market trends as a basis for their investment decisions. As suggested by the Kyle Model (Kyle [1985]), a large number of buy orders is indicative of good market sentiment, whereas a larger number of sell orders is a signal of bad news. If there is complete information, then investors are able to make their own judgments about investment portfolios. However, when information environment is opaque, the best strategy is for investors to infer true information from their counterparts or simply follow others, leading to rampant herd behavior in the market. Moreover, the principal-agent problem between fund managers and shareholders in the asset management industry also intensifies herding. As suggested in Scharfstein and Stein [1990], fund managers might mimic investment strategy from their peers. Hence, we conjecture that the scarcity of reliable information foments herd behavior even for institutional investors.

To study the effect of information environment, we use the following proxies: the number of analysts following, analyst forecast dispersion, and firm size. Analysts help disseminate firm-specific information in a more timely and efficient manner. Therefore, the presence of analysts should enhance market efficiency and reduce herd behavior. However, some "star analysts" have a larger number of followers and thus are capable of generating herd behavior among investors. When investors follow analysts' recommendation indiscriminately, herd behavior becomes observable regardless of the quality of the information.

Panel A of Table 4 presents the nonlinear effect of market return on stock return dispersion across firms with different numbers of analyst following. The analyst data starts from 2003; before 2003, most firms did not have analyst following. We rank the number of analyst following for each industry every year and form 4 portfolios accordingly. We calculate CSAD for each portfolio and estimate Model 1, respectively. Column 1 represents the results for firms whose number of analysts is the least compared with their peers within the same 1-digit CSRC industry. Columns 2–4 represent the other three quantiles.

Observe from panel A that for portfolios with few analysts following, no significant evidence of herding is found. The coefficients of the nonlinear term in the first 2 columns are insignificant. For portfolios with a larger number of analysts following (columns 3 and 4), herd behavior is detected because the coefficient on the quadratic term is significantly negative. Therefore, the very existence of analysts results in herd behavior in China, as investors tend to suppress their own opinions for stocks that are heavily followed by analysts.

Similarly, for each firm, we calculate the dispersion among analysts in their earnings forecast each year. In related literature, analyst forecast dispersion is a widely used proxy for the information environment. We investigate the likelihood of stocks becoming target of herding based on the degree to which they display a large analyst forecast. The results are reported in panel B of Table 4. Surprisingly, it is observed that herding is prevalent across 4 quantiles, suggesting that the degree of analyst disagreement toward the earnings is not an important source of herding, but rather the extent to which analysts follow the stock, that induce investors to herd.

We also examine the possible effect of firm size on herding behavior. One may predict that herding behavior occurs less in large firms, as they tend to be more information transparent compared with that of smaller firms. However, as reported in panel B, no difference of herding behavior can be found for portfolios of different firm sizes; in other words, the degrees of herding behavior are similar for large and small firms.

Table 4. Regression result (subsample split by information environment).

Variable	Quantile 1	Quantile 2	Quantile 3	Quantile 4
Panel A: Number of Analysts Following				
$\|R_{mt}\|$	0.1752***	0.1177***	0.1999***	0.2426***
	(0.034)	(0.038)	(0.029)	(0.029)
R^2_{mt}	−0.0012	−0.0008	−0.0096*	−0.0174***
	(0.007)	(0.007)	(0.006)	(0.006)
Constant	1.5822***	1.7841***	1.5117***	1.4624***
	(0.037)	(0.042)	(0.032)	(0.031)
Observations	2,185	2,185	2,185	2,185
Panel B: Analyst Dispersion				
$\|R_{mt}\|$	0.2106***	0.1965***	0.2186***	0.2402***
	(0.029)	(0.028)	(0.028)	(0.036)
R^2_{mt}	−0.0106*	−0.0101*	−0.0136**	−0.0141**
	(0.006)	(0.006)	(0.006)	(0.007)
Constant	1.4187***	1.4598***	1.4496***	1.5755***
	(0.030)	(0.030)	(0.032)	(0.038)
Observations	2,185	2,185	2,185	2,185
Panel C: Firm Size				
$\|R_{mt}\|$	0.2187***	0.2247***	0.2203***	0.2737***
	(0.029)	(0.029)	(0.027)	(0.026)
R^2_{mt}	−0.0119**	−0.0104*	−0.0103*	−0.0186***
	(0.006)	(0.006)	(0.006)	(0.005)
Constant	1.5112***	1.4219***	1.3781***	1.2716***
	(0.029)	(0.029)	(0.027)	(0.027)
Observations	2,901	2,901	2,901	2,901

Note. This table presents the regression results (all A shares) for $CSAD_t = \alpha + \gamma_1 \mid R_{mt} \mid + \gamma_2 R_{mt}{}^2 + \varepsilon_t$ for 4 portfolios formed by 3 different proxies of information environment. Panel A reports the results for subsample split by the number of analysts following the individual stock. In panel B and panel C, the whole sample is partitioned by analysts forecast dispersion and firm market capitalization. The analyst forecast starts from 2003 as few stocks have been followed by analysts before 2003. The Newey-West heteroscedasticity consistent standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Speculation

There is little doubt that speculation is a prominent catalyst for herding behavior. However, it is impossible to determine whether a particular investor is rational or speculative or whether speculation relates to psychological bias or strategic move. In this article, we focus on one particular aspect of speculation, namely the short-term investor horizon. As pointed out by Froot et al. [1992], myopic investors might herd on limited information; thus, the short-term investor horizon might lead to herd behavior.

We measure speculative behavior using daily turnover or the total trading volume scaled by total tradable shares outstanding. A higher turnover implies a relatively shorter investor horizon. For each trading day, we rank all stocks according to their turnover values and form 4 corresponding portfolios. We then estimate Model 1 for each portfolio. The results are reported in Table 5.

Table 5. Regression result (subsample split by speculation).

Variable	(1) Quantile 1	(2) Quantile 2	(3) Quantile 3	(4) Quantile 4
$\|R_{mt}\|$	0.2513***	0.1903***	0.1881***	0.2212***
	(0.026)	(0.025)	(0.030)	(0.052)
R^2_{mt}	−0.0023	−0.0054	−0.0088	−0.0207*
	(0.005)	(0.005)	(0.006)	(0.011)
Constant	0.8708***	1.0793***	1.4649***	2.6824***
	(0.023)	(0.023)	(0.030)	(0.050)
Observations	2,901	2,901	2,901	2,901

Note. This table presents the regression results (all A shares) for $CSAD_t = \alpha + \gamma_1 \mid R_{mt} \mid + \gamma_2 R_{mt}{}^2 + \varepsilon_t$ for 4 portfolios formed based on investor speculation. Speculation is proxied by turnover ratio, which is measured by each stock's trading volume scaled by total tradable shares outstanding. The Newey-West heteroscedasticity consistent standard errors are reported in parentheses. * and *** indicate significance at the 10% and 1% levels, respectively.

Consistent with our expectation, herd behavior is found in portfolios with the highest turnovers, as the coefficient on the quadratic term is significantly negative. Apart from the highest turnover portfolio, no herd behavior is detected in other portfolios.

Systematic risk and stock synchronicity

Finally, we examine the influence of risk on herd behavior. Investors, individual or institutional, tend to seek advice from others in face of market uncertainty. Shiller and Pound [1989] documented that institutional investors are more likely to listen to other professionals' advice when facing riskier investments. To the extent that institutional investors herd on others' information, such herding would be more profound in stocks with higher risk. We measure risk in terms of systematic risk (beta from the market model $R_{it} - R_{ft} = \beta_0 + \beta_1 (R_{mt} - R_{ft}) + \varepsilon_{it}$), and stock synchronicity (R^2 from the market model). In a similar fashion, we form 4 portfolios based on systematic risk or stock synchronicity and estimate Model 1 for each portfolio. The results are reported in Table 6.

Table 6. Regression result (subsample split by risk and synchronicity).

Variable	Quantile 1	Quantile 2	Quantile 3	Quantile 4
Panel A: Systematic Risk Proxied by Beta of Market Return				
$\|R_{mt}\|$	0.2453***	0.1911***	0.2114***	0.2884***
	(0.026)	(0.026)	(0.027)	(0.030)
R^2_{mt}	−0.0090*	−0.0091	−0.0108*	−0.0225***
	(0.005)	(0.006)	(0.006)	(0.006)
Constant	1.4036***	1.3373***	1.3383***	1.5009***
	(0.029)	(0.026)	(0.027)	(0.030)
Observations	2,901	2,901	2,901	2,901
Panel B: Synchronicity Estimated from Market Model				
$\|R_{mt}\|$	0.2480***	0.2552***	0.2358***	0.2013***
	(0.032)	(0.028)	(0.026)	(0.024)
R^2_{mt}	−0.0087	−0.0171***	−0.0155***	−0.0102**
	(0.006)	(0.006)	(0.006)	(0.005)
Constant	1.7578***	1.4357***	1.2799***	1.1133***
	(0.034)	(0.028)	(0.027)	(0.024)
Observations	2,901	2,901	2,901	2,901

Note. This table presents the regression results (all A shares) for $CSAD_t = \alpha + \gamma_1 \mid R_{mt} \mid + \gamma_2 R_{mt}{}^2 + \varepsilon_t$ for 4 portfolios formed based on systematic risk and stock synchronicity. Systematic risk is measured by beta from the 30-day rolling regression $R_{it} = \beta_0 + \beta_0 R_{mt} + \varepsilon_{it}$. In Panel B, the whole sample is split based on synchronicity, which is measured by R^2 from the market model. The Newey-West heteroscedasticity consistent standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 6 shows that herd behavior mainly exists in portfolios with higher systematic risk and stock synchronicity. In panel A, when systematic risk is small, the coefficient on nonlinear term is either insignificant or marginally significant. However, when systematic risk is high, the coefficient of the nonlinear term is highly significant. Similarly, one can find in panel B that portfolios of stocks with high synchronicity show sign of herding. Therefore, herding is not prevalent for Chinese stocks with high idiosyncratic risk but more prevailing for stocks with high systemic risk.

Conclusion

Despite the growing importance of the Chinese stock market, the existence and cause of herd behavior in this market has yet to be fully elucidated. In this study, we investigate herd behavior in the Chinese stock market following the methodology proposed by Chang et al. [2000]. A nonlinear regression specification of CSAD and market return is employed to examine the herd behavior in the Chinese A-share market. In the absence of herd behavior, classic asset pricing theory (CAPM) predicts that CSAD is a linear function of absolute value of market return. Any nonlinear relation between CSAD and market return is evidence of deviation from CAPM. Particularly, when investors suppress their own belief and follow the market sentiment, we should find a negative correlation between cross-sectional absolute deviation of individual stock returns from market return and nonlinear term of market return.

Indeed, we find significant evidence of the presence of herd behavior over the whole sample period and the extreme market condition in October 2007 and October 2008. Furthermore, we have examined the effects of governmental intervention, informational environment, speculation, and systematic risk on herding. It is found that analysts following would lead to herding, and that herd behavior is mostly concentrated in firms with high turnover ratio or high systematic risks. However, we cannot find evidence that relates herding to firm size, and no noticeable difference in herding between SOEs and non-SOEs is detected.

Notes

1. If we extend our results from 2000 to the inception of Shanghai Stock Exchange or Shenzhen Stock Exchange,

the results do not alter much. The reason for selecting a sample period after 2000 is because the information of analyst following is more available after this year.

2. Apart from stock markets, Gleason, Lee, and Mathur [2003] study herd behavior in European futures markets, and Gleason, Mathur, and Peterson [2004] conduct a detailed analysis on the intraday herd behavior of the ETF market.
3. When we extend the crisis period from September 2007 to November 2008, the results still hold.

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