"Mutual fund herding behavior and investment strategies in Chinese stock market"

AUTHORS	John Wei-Shan Hu Yen-Hsien Lee Ying-Chuang Chen

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
20	0	5

John Wei-Shan Hu, Professor,
Departments of Business
Administration and Finance, Chung
Yuan Christian University, Taiwan.

Yen-Hsien Lee, corresponding author,
Chairman and Associate Professor,
Department of Finance, Chung Yuan
Christian University, Taiwan.

Ying-Chuang Chen, Master,
Department of Business
Administration, Chung Yuan
Christian University, Taiwan.

John Wei-Shan Hu (Taiwan), Yen-Hsien Lee (Taiwan), Ying-Chuang Chen (Taiwan)

MUTUAL FUND HERDING BEHAVIOR AND INVESTMENT STRATEGIES IN CHINESE STOCK MARKET

Abstract

This investigation studies the impact of mutual fund herding on the returns achieved by contrarian strategy from 1990 to 2015 in the Chinese stock market. The relationship between the profit gained by the contrarian strategy and the macroeconomic environment is also examined. First, the returns of the contrarian strategy in China's stock market are found to be significant. Second, most loser stocks with a high degree of mutual fund herding outperform loser stocks with a low degree of mutual fund herding, revealing that the profitability of an investment portfolio depends on the degree of mutual fund herding. Third, investors should buy loser stocks with a high degree of herding and sell winner stocks with a low degree of herding during a two-year formation period, over which zero-cost contrarian strategies yield the significantly highest return. Finally, the payoff of contrarian strategies is positively related to the herding effect and negatively related to macroeconomic variables.

INTRODUCTION

Investment strategies, which can be grouped into contrarian and momentum strategies, have been the topic of many financial studies. Investors who follow contrarian strategies buy previous losers and sell previous winners. Contrarian strategies differ from momentum strategies, which involve buying past winners and selling past losers. Contrarian strategies were examined by Bondt and Thaler (1985) who identified an overreaction phenomenon in the market causing past losing stocks to outperform past winning stocks. Contrarian strategies have been validated for the American stock market (Lakonishok et al., 1994) and for A-shares in China's (Kang et al., 2002; Chao & Wu, 2004) stock market. The literature presents contradictory findings concerning period for which a contrarian strategy is successful in China's stock market[1]. Jegadeesh and Titman (1993) proposed the first momentum strategy, which involved buying stocks that had performed well in the past and selling stocks that had performed poorly in the past, yielding a significantly positive return over a one-year holding period. The momentum strategy is valid for the American (Wang

---

[1] Kang et al. (2002) found that the short-horizon contrarian strategy yields significantly abnormal profit primarily owing to overreaction to specific information. Chao and Wu (2004) found that the contrarian strategies are one to two years, and that the shorter of contrarian strategies on the Chinese stock market than on in the American stock market is responsible for the high turnover in the Chinese stock market. Hu and Lu (2010) found that a contrarian strategy outperforms a momentum strategy in commodity futures, regardless of the holding period, and that metals futures are the only commodity futures that do not exhibit significant contrarian effects.

& Wu, 2011) and Chinese (Cheema & Nartea, 2014) stock markets. The literature reveals that significant profits can be gained over a short horizon using a contrarian strategy and over an intermediate horizon using the momentum strategy on the American (Yao, 2012) and Chinese (Cheema & Nartea, 2014) stock markets. The literature presents contradictory findings about the validity of contrarian and momentum strategies in the Chinese stock market. This study identifies the most effective of these two prominent stock trading strategies for the Chinese stock market.

The relevant literature presents several findings concerning the behaviors of investors in financial markets. Herding behaviors are very prevalent. Herding behavior is defined as the copying by investors of the behaviors of other investors and the making of similar decisions. The literature (Christie & Huang, 1995; Demirer et al., 2015; Hung et al., 2010; Lakonishok et al., 1992; Nofsinger & Sias, 1999; Sias, 2004) has shown significant institutional herding behavior. Nofsinger and Sias (1999) proposed that the effect of the herding behavior of institutional investors exceeds that of individual investors. Demirer et al. (2015) found that the profitability of an investment strategy depends on the degree of herding. Thus, this study evaluates the effect of mutual fund herding on the contrarian strategy in Chinese stock market.

Also, Jegadeesh and Titman (1993) proposed the establishment of zero-cost portfolios based on the momentum strategy. Grinblatt and Moskowitz (1999) constructed zero-cost portfolios using industrial stocks. Subsequently, Demirer et al. (2015) formed a portfolio based on the asymmetric relationship between herding and momentum returns and suggested the implementation of zero-cost portfolios. However, few investigations have considered herding behavior in relation to the use of a contrarian strategy to build zero-cost portfolios[2]. To elucidate the economic value of the asymmetric relationship between herding and an investment strategy, this investigation examines the profitability of a zero-cost portfolio which is based on various degrees of herding and a contrarian strategy.

In the Chinese stock market, economic and political changes are important factors in any examination of investment strategies for that market. The literature (Wang et al., 2014) has shown that economic policy uncertainty strongly affects many firms' investment activities. Chordia and Shivakumar (2002) found that the payoffs of momentum strategies can be explained using a set of lagged macroeconomic variables. Stivers and Sun (2010) performed regression analysis to study the effect of herding behavior on the outcomes of momentum strategies. However, few studies have considered the relationships between the returns of contrarian strategy and macroeconomic factors. Owing to the huge effects political changes in China, the relationships between the returns of investment strategy and macroeconomic factors are examined herein.

This study contributes significantly to this field of research and fills a gap in the literature. It uses an intuitive herding measure that was proposed by Lakonishok et al. (1992) and individual stock data to elucidate the effect of investment strategies in the Chinese stock market. This investigation also considers the asymmetric relationship between herding behavior and investment portfolios to construct zero-cost portfolios. This study also analyzes the relations between the profit generated by the contrarian strategy and macroeconomic factors. The findings are as follows. First, unlike the momentum strategy, the contrarian strategy is profitable over a long period in the Chinese stock market. Second, most loser stocks with a high degree of mutual fund herding outperform loser stocks with a low degree of mutual fund herding. Third, a zero-cost portfolio, with a long position in a loser portfolio with high herding and a short position in a winner portfolio with low herding, yields the significantly highest return during a formation period of two years. Fourth, contrarian strategies can be explained by mutual fund herding and macroeconomic factors.

The rest of this study proceeds as follows. Section 1 presents the data and methodology used. Section 2 discusses empirical results, and last section draws conclusions.

---

2   A zero-cost portfolio is constructed by simultaneously buying one stock portfolio and selling another stock portfolio.

1. DATA AND METHODOLOGY

1.1. Data

Stock files consist of A-shares and B-shares that are listed on the Shanghai and Shenzhen stock exchanges, as well as in the growth enterprise market, and include a total of 2,832 quarterly stock returns. Our sample on the Mutual Fund Holdings database includes 1,385 mutual funds. Macroeconomic variables are such as exchange rate, interest rate, policy uncertainty[3] and leading indicator. This paper uses PCA (principal component analysis) to combine the exchange rate, the interest rate, policy uncertainty and leading indicator as macroeconomic indicator. A dataset that covered the period from January 1995 to December 2015 was obtained from the CSMAR (China Stock & Accounting Research) database.

1.2. Methodology

1.2.1. Construction of investment strategy

This study investigates the performance of a contrarian strategy with various formation and holding periods of two, four, eight and twelve quarters. Since four formation periods and four holding periods are used, 16 (4×4) contrarian strategies are developed. First, to construct portfolios of winner and loser stocks, stocks are sorted in order of ascending return during the formation period. Based on this sorting, five equally sized quintile portfolios are formed. The quintile portfolio with the highest average stock return is the winner portfolio and that with the lowest average stock return is the loser portfolio. Next, the average return of the winner and loser portfolio in the holding period is calculated, and the difference between the returns of those portfolios is obtained using a t-test. If the difference between the returns of the loser and winner portfolios in the holding period is significantly positive (negative), then the contrarian (momentum) strategy is regarded as effective.

1.2.2. Herding effect

In the literature (Demirer et al., 2015), the CSSD (Cross-Sectional Standard Deviation) and the CASD (Cross-Sectional Absolute Standard Deviation) methods, which are based on the early studies of Christie and Huang (1995) and Chang et al. (2000), are utilized to calculate herding behavior and measure the effect of herding on the returns of momentum strategy. Although the CSSD and CASD methods use the standard deviation of the cross-sectional return between stock market and individual stocks to measure the herding effect, the model that was developed by Lakonishok et al. (1992) concerns changes in an investor's asset holding to evaluate the herding effect, and is therefore more intuitive. In this study, the method of Lakonishok et al. (1992) is used to evaluate mutual fund herding behavior. The model is expressed as

$$HM_{i,t} = \left| p_{i,t} - p_t \right| - AF_{i,t}, \qquad (1)$$

$$p_{i,t} = \frac{B_{i,t}}{B_{i,t} + S_{i,t}}, \qquad (2)$$

where $HM_{i,t}$ is the herding coefficient of a mutual fund in stock i in quarter t; $B_{i,t}$ is the number of mutual funds that buy stock i in quarter t; $S_{i,t}$ is the number of mutual funds that sell stock i in quarter t; $p_{i,t}$ is the ratio of the number of buyers of stock i to the number of all mutual funds traded stock i in quarter t; p_t is the cross-sectional average of the fraction of buyers across all stocks in quarter t, and $AF_{i,t}$ is the adjustment factor that was defined by Lakonishok et al. (1992).

1.2.3. Effect of herding behavior on the return of contrarian strategy

To measure the impact of mutual fund herding on the return of the contrarian strategy, first, quarterly herding coefficients $HM_{i,t}$ are sorted in ascending order. Based on the sorting, three equally sized groups are formed. The group with the highest (lowest) herding is defined as the high (low) herding group. Next, the winner portfolios and loser portfolios are sorted by the degree of herding during the formation period and subsequent returns during the holding period are calculated. The t-test is performed to determine the difference between returns of highest and lowest herding on winner or loser portfolios; if the difference is

---

3   This paper follows Wang et al. (2014) to use the economic policy uncertainty.

significant, then mutual fund herding is regarded as having an impact on the return of investment strategies.

Based on this asymmetric herding relationship with the investment strategies, we analyze a zero-cost contrarian strategy, which involves taking a long position in the loser portfolio while taking a short position in the winner portfolio with a different degree of herding, which is established as the returns of these portfolios during the subsequent holding period are calculated.

1.2.4. Relation between contrarian strategy and macroeconomic variables

To measure the relationship between contrarian strategy and macroeconomic variables, this investigation follows Wang et al. (2014) in using PCA (principal component analysis) to combine the exchange rate, the interest rate, policy uncertainty and leading indicator as macroeconomic indicator. This study then follows Stivers and Sun (2010) in examining the relationship between investment strategies and herding behavior, and uses macroeconomic indicators in the following regression model:

$$Cont_t = \beta_0 + \beta_1 herding_t + \\ + \beta_2 macroe_t + \beta_3 S_t R_t + \varepsilon_t, \qquad (3)$$

where $Cont_t$ represents the profit generated by contrarian strategies with a particular formation period and holding period; β_0 is the intercept;

$herding_t$ is the coefficient of mutual fund herding behavior; $macroe_t$ is the macroeconomic indicator that comprises exchange rate, interest rate, uncertainty and leading indicator; $S_t R_t$ is the accumulated lagged three-year return; ε_t is the residual, and β are coefficients to be estimated.

2. EMPIRICAL RESULTS

2.1. Descriptive statistics

Table 1 presents descriptive statistics concerning stocks of interest and the herding effect of mutual funds. The stocks include A-shares and B-shares on the Shanghai and Shenzhen stock exchanges, as well as Growth Enterprise Market. The data are generated from a total of 2,832 stock quarterly returns. Herding refers to according to Eq. (1). The highest return of a stock in the Chinese stock market is 22.053%, while the lowest is –0.897%.

Table 1. Descriptive statistics

Variable	Means	Std. Dev.	Minimum	Maximum
Return of the stock	0.018	0.169	–0.897	22.053
Mutual fund herding	0.090	0.000	0.090	0.541

Note: Dataset from 1995 to 2015 includes a total of 2,832 stock quarterly returns. Quarterly herding of mutual funds with respect to each stock is quantified using Eq. (1).

Table 2. Contrarian strategy

Portfolios	H2	t-value	H4	t-value	H8	t-value	H12	t-value
F2Loser	0.64***	26.65	0.61***	33.33	0.58***	44.57	0.58***	55.75
F2Winner	0.73***	29.55	0.57***	31.6	0.43***	33.27	0.37***	35.43
Spread	–0.09***	–2.63	0.04	1.39	0.14***	7.84	0.21***	14.40
F4Loser	0.83***	33.31	0.36***	19.57	0.67***	49.51	0.62***	57.04
F4Winner	0.64***	25.19	0.78***	42.49	0.34***	25.37	0.29***	27.19
Spread	0.19***	5.38	–0.43***	–16.46	0.33***	17.18	0.33***	21.54
F8Loser	1.07***	39.82	0.66***	33.3	0.76***	49.69	0.65***	54.21
F8Winner	0.64***	23.55	0.61***	30.75	0.22***	15.07	0.22***	19.02
Spread	0.43***	11.23	0.05*	1.84	0.54***	25.71	0.43***	25.94
F12Loser	1.15***	38.33	0.73***	32.96	0.74***	45.05	0.74***	58.36
F12Winner	0.37***	12.79	0.41***	19.53	0.14***	8.81	0.17***	13.79
Spread	0.79***	18.99	0.32***	10.30	0.60***	26.48	0.57***	32.12

Note: F2, F4, F8, F12 are formation periods of 2, 4, 8, 12 quarters; H2, H4, H8, H12 are holding periods of 2, 4, 8, 12 quarters. Winner (loser) portfolio of stocks is quintile portfolio with highest (lowest) average stock returns. Spread is difference between returns of loser and winner portfolios; *, **, and *** denote significance at 10%, 5% and 1% levels, respectively.

2.2. Contrarian strategy

Table 2 presents empirical data concerning the contrarian strategy for the Chinese stock market. Stocks are sorted in order of ascending average return over the formation period. Then, five equally sized quintile portfolios are formed. The quintile portfolio with the highest average return is the winner portfolio and that with the lowest average return is the loser portfolio. The average returns of the winner and loser portfolios during the holding period and the difference between the returns of the loser portfolio and the winner portfolio are calculated. The momentum strategy provides significant positive returns with formation and holding periods of two or four quarters.

Table 2 also shows that the contrarian strategy provides a significant positive return, except a formation period of two quarter and the holding periods of two and four quarters. This paper found the highest returns of the contrarian strategies is 0.79 with a formation period of twelve quarter and the holding period of two quarter. This study also shows that the contrarian strategy provides a significant positive return with a formation period of eight or 12 quarters, regardless of the holding period, and with a holding period of eight or twelve quarters, regardless of the formation period. This result reveals that the contrarian strategy is more effective over the long run than the short run. This finding is consistent with that of Chao and Wu (2004) who found that the contrarian strategy was effective over holding periods of one to two years.

2.3. Effect of degree of herding on investment portfolios

Table 3 presents empirical evidence concerning the degree of herding on the returns of winner, loser and contrarian strategy in the Chinese stock market. The study defines three groups by herding. The group with the highest (lowest) degree of herding is defined as the high (low) herding group. The winner portfolios and loser portfolios are then sorted by their degree of herding during the formation period, and returns during the subsequent holding period are calculated. No significant difference is found between the returns of winner portfolios with high and low degrees of herding, implying an insignificant spread between winners with high herding and low herd-

ing in each period, except with formation (F) and holding (H) periods of (F = 8, H = 2), (F = 8, H = 4), (F = 12, H = 2) and (F = 12, H = 4) quarters.

Loser stock portfolios with high herding significantly outperform loser stock portfolios with low herding over all periods except formation (F) and holding (H) periods of (F = 2, H = 12), (F = 4, H = 12), (F = 8, H = 12), (F = 12, H = 2), (F = 12, H = 4) and (F = 12, H = 12) quarters. Mutual fund herding has an asymmetric effect on loser stock portfolio returns, and the profitability of the investment portfolio depends on the degree of mutual fund herding. This finding is consistent with a previous study (Demirer et al. 2015), which found asymmetry between herding and momentum.

2.4. Zero-cost strategies

Table 4 presents empirical evidence concerning return on zero-cost portfolios. To study the economic value of a zero-cost strategy which is based on the asymmetric effect of herding behavior on the return of investment portfolio, this study uses the zero-cost contrarian strategies that involve taking a long position in a loser portfolio with various degrees of herding while simultaneously taking a short position in a winner portfolio with various degrees of herding. Returns during the subsequent holding period are then calculated. These findings reveal that taking a long position in a loser portfolio with a high degree of herding while taking a short position in a winner portfolio with a low degree of herding yields the significantly highest return over formation (F) and holding (H) periods of (F = 2, H = 8), (F = 4, H = 2), (F = 4, H = 8), (F = 8, H = 2), (F = 8, H = 4), (F = 8, H = 8), (F = 12, H = 2), and (F = 12, H = 8) quarters. Taking a long position in a loser portfolio with a high degree of herding while taking a short position in a winner portfolio with a high degree of herding yields the significantly highest return over formation (F) and holding (H) periods of (F = 2, H = 4), (F = 2, H = 12), (F = 4, H = 12) and (F = 8, H = 12) quarters. The zero-cost contrarian strategies generate the highest returns when they buy losers with high herding and sell winners with low herding over a formation period of eight quarters and a holding period of two quarters. Overall, this study found the returns of investment strategies with higher herding in their long positions in loser portfolios are significant positive.

Table 3. Effect of degree of herding on return of investment portfolio

Herding	Portfolio	F2H2	t-value	F2H4	t-value	F2H8	t-value	F2H12	t-value
High	Winner	1.19***	9.35	0.71***	7.49	0.55***	8.73	0.55***	11.34
Low	Winner	1.18***	8.7	0.72***	7.22	0.53***	8.39	0.60***	12.78
Spread		0.02	0.08	−0.01	−0.09	−0.01	0.22	−0.05	−0.79
High	Loser	1.33***	10.03	1.05***	10.55	0.85***	13.42	0.74***	15.63
Low	Loser	0.98***	7.86	0.66***	7.09	0.53***	9.37	0.68***	16.76
Spread		0.34*	1.88	0.39***	2.84	0.32***	3.78	0.05	0.92
Herding	Portfolio	F4H2	t-value	F4H4	t-value	F4H8	t-value	F4H12	t-value
High	Winner	1.21***	9.13	1.05***	10.49	0.52***	8.03	0.51***	10.49
Low	Winner	0.94***	6.99	1.02***	10.14	0.42***	6.92	0.59***	12.70
Spread		0.27	1.43	0.03	0.24	0.10	1.10	−0.07	−1.11
High	Loser	1.64***	12.67	0.90***	9.34	0.93***	15.29	0.78***	17.06
Low	Loser	1.04***	8.42	0.35***	3.98	0.65***	11.58	0.74***	18.16
Spread		0.59***	3.28	0.55***	4.21	0.28***	3.35	0.04	0.64
Herding	Portfolio	F8H2	t-value	F8H4	t-value	F8H8	t-value	F8H12	t-value
High	Winner	1.35***	9.89	1.17***	11.25	0.62***	9.53	0.64***	12.99
Low	Winner	0.91***	6.68	0.85***	8.55	0.51***	8.21	0.65***	13.84
Spread		0.45**	2.31	0.32**	2.22	0.11	1.20	−0.01	−0.23
High	Loser	1.88***	14.45	1.10***	11.95	0.95***	15.46	0.77***	16.86
Low	Loser	1.28***	10.17	0.65***	7.14	0.71***	12.33	0.76***	18.30
Spread		0.60***	3.31	0.45***	3.49	0.24***	2.83	0.01	0.17
Herding	Portfolio	F12H2	t-value	F12H4	t-value	F12H8	t-value	F12H12	t-value
High	Winner	1.41***	10.49	1.16***	11.5	0.63***	9.82	0.70***	14.15
Low	Winner	0.93***	7.12	0.80***	8.22	0.54***	8.76	0.73***	15.17
Spread		0.48**	2.56	0.36**	2.57	0.09	0.96	−0.03	−0.46
High	Loser	1.64***	13.16	0.90***	10.15	0.87***	14.12	0.78***	16.58
Low	Loser	1.46***	11.30	0.79***	8.57	0.71***	12.45	0.72***	16.98
Spread		0.17	0.95	0.12	0.89	0.16*	1.84	0.06	0.95

Note: F2H2 is the return during a formation period of two quarters and following a holding period of two quarters; F2H4 is the return during a formation period of a two quarters and following a holding period of four quarters; F4H2 is the return during a formation period of two quarters and following a holding period of eight quarters; F4H4 is the return during a formation period of four quarters and following a holding period of four quarters; F8H2 is the return during a formation period of eight quarters and following a holding period of two quarters; F8H4 is the return during a formation period of eight quarters and following a holding period of four quarters; F12H2 is the return during a formation period of 12 quarters and following a holding period of two quarters; F12H4 is the return during a formation period of 12 quarters and following a holding period of four quarters. A winner (loser) portfolio of stocks is the quintile portfolio with the highest (lowest) mean stock returns. Mutual funds are sorted into three equally sized groups based on their herding coefficient, calculated using Eq. (1); the group with the highest (lowest) herding is defined as the high (low) herding group. Spread is difference between returns of high herding and low herding portfolios; *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

2.5. Relationship between the returns of contrarian strategies and macroeconomic indicator

Table 5 shows the results of the regression analysis, based on Eq. (3), and reveals whether herding behavior and macroeconomic indicator affect the return of the contrarian strategy. This study follows Stivers and Sun (2010) in examining the relationship between the return of contrarian strategy and herding behavior. This study finds that the estimated β_1 of the herding term statistically significantly affect the return of contrarian strategies over formation and holding periods of (F = 2, H = 2), (F = 2, H = 4), (F = 2, H = 8), (F = 4, H = 2), (F = 4, H = 4), (F = 4, H = 8), (F = 8, H = 2) and (F = 12, H = 2), for which the coefficients are 0.122, 0.0662, 0.0426, 0.137, 0.0811, 0.0547, 0.0854 and 0.0827. These results reveal that herding behavior by mutual funds is positively related to the return

of a contrarian strategy over the specified formation and holding periods.

The estimated β_2 of macroeconomic term statistically significantly affects the payoff of contrarian strategies over formation and holding periods of (F = 2, H = 12), (F = 4, H = 8), (F = 4, H = 12), (F = 8, H = 8), (F = 8, H = 12), (F = 12, H = 2), (F = 12, H = 4), (F = 12, H = 8) and (F = 12, H = 12), for which the coefficients are −0.0119, −0.0164, −0.0158, −0.0219, −0.0179, −0.0411, −0.0516, −0.0459 and −0.0290, respectively. These results reveal that macroeconomic factors are negatively related to the return of a contrarian strategy over the specified formation and holding periods. A higher (lower) macroeconomic indicator means that the macroeconomic situation is getting worse (better). The macroeconomic situation is negatively related to the payoff of a contrarian strategy over the specified formation and holding periods.

Table 4. Zero-cost portfolios

Spread	F2H2	F2H4	F2H8	F2H12
High herding Loser-High herding Winner	0.13	0.34**	0.30***	0.20***
Low herding Loser-High herding Winner	−0.21	−0.05	−0.02	0.14**
High herding Loser-Low herding Winner	0.15	0.33**	0.32***	0.14**
Low herding Loser-Low herding Winner	−0.20	−0.06	−0.00	0.08
Spread	F4H2	F4H4	F4H8	F4H12
High herding Loser-High herding Winner	0.42**	−0.16	0.41***	0.27***
Low herding Loser-High herding Winner	−0.17	−0.71***	0.13	0.23***
High herding Loser-Low herding Winner	0.69**	−0.12	0.51***	0.20***
Low herding Loser-Low herding Winner	0.10	−0.67***	0.23***	0.16**
Spread	F8H2	F8H4	F8H8	F8H12
High herding Loser-High herding Winner	0.53***	−0.07	0.33***	0.13*
Low herding Loser-High herding Winner	−0.08	−0.52***	0.09	0.12*
High herding Loser-Low herding Winner	0.97***	0.25*	0.43***	0.12*
Low herding Loser-Low herding Winner	0.37**	−0.20	0.20**	0.11*
Spread	F12H2	F12H4	F12H8	F12H12
High herding Loser-High herding Winner	0.22	−0.26*	0.24***	0.09
Low herding Loser-High herding Winner	0.05	−0.38***	0.09	0.03
High herding Loser-Low herding Winner	0.71***	0.10	0.33***	0.05
Low herding Loser-Low herding Winner	0.53***	−0.01	0.17**	−0.01

Note: RFH2 is the spread between the average return of loser and winner stock portfolios during a formation period of two quarters and following a holding period of two quarters; F2H4 is the spread between the average returns of the loser and winner stock portfolios during a formation period of two quarters and following a holding period of four quarters ; F4H2 is the spread between the average return of the loser and winner stock portfolios during a formation period of four quarters and following a holding period of two quarters; F4H4 is the spread between the average return of loser and winner stock portfolios during a formation period of four quarters and following a holding period of four quarters; F8H2 is the spread between the average return of loser and winner stock portfolios during a formation period of eight quarters and following a holding period of two quarters; F8H4 is the spread between the average return of loser and winner stock portfolios during a formation period of eight quarters and following a holding period of four quarters; F12H2 is the spread between the average return of loser and winner stock portfolios during a formation period of 12 quarters and following a holding period of two quarters; F12H4 is the spread between the average return of loser and winner stock portfolios during a formation period of 12 quarters and following a holding period of four quarters. The winner (loser) portfolio of stocks is the quintile portfolio with the highest (lowest) mean stock returns. Mutual funds are sorted into three equally sized groups by herding coefficient, calculated using Eq. (1), and the one group with the highest (lowest) herding is defined as the high (low) herding group; *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

Table 5. The impact of herding and macroeconomic indicator on returns of contrarian strategies

Return	Cons	p-values	Herding	p-values	Macroe	p-values	StR	p-values
Y1	−0.0221***	(0.009)	0.108**	(0.034)	0.0367*	(0.086)	0.0553***	(0.000)
Y2	−0.0127**	(0.022)	0.0616*	(0.062)	0.0129	(0.315)	0.0482***	(0.000)
Y3	−0.00670*	(0.061)	0.0472**	(0.025)	−0.0128	(0.130)	0.0191***	(0.000)
Y4	0.00180	(0.435)	−0.00518	(0.710)	−0.0119*	(0.064)	0.0223***	(0.000)
Y5	−0.0234***	(0.002)	0.132***	(0.004)	0.0124	(0.519)	0.0694***	(0.000)
Y6	−0.0205***	(0.000)	0.0857***	(0.000)	−0.0128	(0.268)	0.0425***	(0.000)
Y7	−0.00787***	(0.001)	0.0606***	(0.000)	−0.0164**	(0.015)	0.0295***	(0.000)
Y8	0.00274	(0.290)	−0.00825	(0.614)	−0.0158***	(0.009)	0.0343***	(0.000)
Y9	−0.0134*	(0.074)	0.0817*	(0.070)	0.0102	(0.579)	0.0619***	(0.000)
Y10	−0.00891*	(0.085)	0.0380	(0.213)	−0.00930	(0.490)	0.0414***	(0.000)
Y11	0.00203	(0.626)	0.00786	(0.751)	−0.0219**	(0.023)	0.0379***	(0.000)
Y12	0.00829**	(0.046)	−0.0369	(0.158)	−0.0179**	(0.044)	0.0391***	(0.000)
Y13	−0.0105	(0.165)	0.0974**	(0.032)	−0.0411**	(0.046)	0.0520***	(0.000)
Y14	−0.00196	(0.767)	0.0229	(0.557)	−0.0516***	(0.002)	0.0405***	(0.000)
Y15	0.00489	(0.357)	0.00102	(0.974)	−0.0459***	(0.000)	0.0407***	(0.000)
Y16	0.0103**	(0.031)	−0.0420	(0.159)	−0.0290***	(0.005)	0.0396***	(0.000)

Note: Y1-Y16 are the profits of contrarian strategies with formation and holding periods of (F = 2, H = 2), (F = 2, H = 4), (F = 2, H = 8), (F = 2, H = 12), (F = 4, H = 2), (F = 4, H = 4), (F = 4, H = 8), (F = 4, H = 12), (F = 8, H = 2), (F = 8, H = 4), (F = 8, H = 8), (F = 8, H = 12), (F = 12, H = 2), (F = 12, H = 4), (F = 12, H = 8) and (F = 12, H = 12), respectively. Cons is the intercept. Macroe is the macroeconomic indicator that incorporates exchange rate, interest rate, uncertainty and leading indicator. Herding refers to the mutual fund herding behavior. StR is the accumulated lagged three-year return; *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

CONCLUSION

This investigation studies contrarian strategies in the Chinese stock market and the impact of herding behavior on the returns of such strategies. The literature (Demirer et al., 2015) shows the impact of herding behavior on the return of the momentum strategy and discusses the construction of zero-cost portfolios using herding and momentum strategies. This study considers the effect of herding behavior on the returns of contrarian strategies and zero-cost portfolios that are based on asymmetry between herding behavior and the returns of investment portfolios.

First, this investigation finds that a contrarian strategy that involves buying a loser stock portfolio and selling a winner stock portfolio is effective in the Chinese stock market. Second, most loser stocks with a high degree of mutual fund herding outperform those with a low degree of mutual fund herding. The profitability of investment portfolios depends on the degree of mutual fund herding. Third, a zero-cost portfolio that buys loser portfolios with high herding and sells winner portfolios with low herding yield the significantly highest return during a formation period of eight quarters. Fourth, mutual fund herding is positively related to the return of a contrarian strategy with formation and holding periods of less than one year and less than two years, respectively, or of more than two years and two quarters, respectively. This investigation also finds that the macroeconomic situation is negatively related to the payoff of the contrarian strategy over the specified formation and holding periods. In conclusion, this study shows that the payoff of a contrarian strategy can be explained by mutual fund herding behavior and macroeconomic variables. Investors should adopt a contrarian strategy for the Chinese stock market. Furthermore, the empirical results in this study reveal that mutual fund managers tend to copy the behaviors of other mutual fund managers and make similar decisions, so investors should consider the mutual fund herding and adjust their investment strategies accordingly.

REFERENCES

1. Bondt, W. F. M., & Thaler, R. (1985). Does the Stock Market Overreact? *The Journal of Finance, 40*(3), 793-805. https://doi.org/10.2307/2327804

2. Chang, E. C., Cheng, J. W., & Khorana, A. (2000). An Examination of Herd Behavior in Equity Markets: An International Perspective. *Journal of Banking & Finance, 24*(10), 1651-1679. http://dx.doi.org/10.1016/S0378-4266(99)00096-5

3. Chao, M., & Wu, C. F. (2004). Tests of Contrarian Strategy Evidence from the Chinese Stock Market. *Systems Engineering-theory & Practice, 1,* 30-34.

4. Cheema, M. A., & Nartea, G. V. (2014). Momentum returns and information uncertainty: Evidence from China. *Pacific-Basin Finance Journal, 30,* 173-188.

5. Chordia, T., & Shivakumar, L. (2002). Momentum, Business Cycle, and Time-varying. *The Journal of Finance, 57,* 985-1019. https://doi.org/10.1111/1540-6261.00449

6. Christie, W. G., & Huang, R. D. (1995). Following the Pied Piper: Do Individual Returns Herd around the Market? *Financial Analysts Journal, 51,* 31-37. https://doi.org/10.2469/faj.v51.n4.1918

7. Demirer, R., Lien, D., & Zhang, H. (2015). Industry Herding and Momentum Strategies. *Pacific-Basin Finance Journal, 32,* 95-110.

8. Grinblatt, M., & Moskowitz, T. J. (1999). Do Industries Explain Momentum? *The Journal of Finance, LIV,* 1249-1290.

9. Hu, W. S., & Lu, C. R. (2010). Investment Returns from Applying Contrarian Strategies to America Commodity Futures. Paper presented at the *85th WEA Annual Conference, Oregon, United States of America.*

10. Hung, W., Lu, C. C., & Lee, C. F. (2010). Mutual Fund Herding its Impact on Stock Returns: Evidence from the Taiwan Stock Market. *Pacific-Basin Finance Journal, 18,* 477-493.

11. Jegadeesh, N., & Titman, S. (1993). Returns to Buying Winners and Selling Losers Implications for Stock Market Efficiency. *The Journal of Finance, 48,* 65-91. https://doi.org/10.1111/j.1540-6261.1993.tb04702.x

12. Kang, J., Liu, M.-H., & Ni, S. X. (2002). Contrarian and Momentum Strategies in the China Stock Market: 1993–2000. *Pacific-Basin Finance Journal, 10,* 243-265.

13. Lakonishok, J., Shleifer, A., & Vishny, R. W. (1992). The Impact of Institutional Trading on Stock Prices. *Journal of Financial Economics, 32,* 23-43.

14. Lakonishok, J., Shleifer, A., & Vishny, R. W. (1994). Contrarian Investment, Extrapolation and Risk. *The Journal of Finance, 49,* 1541-1578.

15. Nofsinger, J. R., & Sias, R. W. (1999). Herding and Feedback Trading by Institutional and Individual Investors. *The Journal of Finance, 6,* 2263-2295.

16. Sias, R. W. (2004). Institutional Herding. *The Review of Financial Studies, 17,* 165-206.

17. Stivers, C., & Sun, L. (2010). Cross-Sectional Return Dispersion and Time Variation in Value and Momentum Premiums. *Journal of Financial and Quantitative Analysis, 45,* 987-1014.

18. Wang, J., & Wu, Y. (2011). Risk adjustment and momentum sources. *Journal of Banking & Finance, 35,* 1427-1435.

19. Wang, Y., Chen, C. R., & Huang, Y. S. (2014). Economic policy uncertainty and corporate investment: Evidence from China. *Pacific-Basin Finance Journal, 26,* 227-243. https://doi.org/10.1016/j.pacfin.2013.12.008

20. Yao, Y. (2012). Momentum, contrarian, and the January seasonality. *Journal of Banking & Finance, 36,* 2757-2769.