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The effects of uncertainty of available information on investors' behaviors on herding formation

Ali Saeedi[a] and Zeinab Ramezani Chahardeh[b*]

[a]*Head of Accounting Department, Tehran North Branch, Islamic Azad University, Tehran, Iran*
[b]*Master of Accounting, Tehran North Branch, Islamic Azad University, Tehran, Iran*

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ABSTRACT

During the past century, there were different events where herding behavior created market turbulence and many investors were hurt, significantly. In this paper, we perform a survey to investigate investors' behavior on creating herding behavior when they face with various levels of uncertainty on available information on the market. The survey designs a questionnaire, distributes it among some investors, and analyzes the results. The findings of our survey indicate that when there is a high level of uncertainty on publicly disclosed information, most investors assign more weights on confidential information or make no decision. In the event the uncertainty is on moderate level, investors rely more on publicly announced news and follow others' behaviors. Finally, when the level of uncertainty is low, most investors depend on public information but this uncertainty creates less herding behavior compared with the previous case. The study also indicates that those investors who are normally making their decision with high inertia are not influenced by herding behavior.

1. Introduction

Behavioral finance is a new area in economics that has recently become a subject of interest to investors. Herding behavior has frequently been observed in different stock exchange around the worlds such as in the stock market crash of 1987 (Devenow & Welch, 1996; Camerer et al., 2011) and in the foreign exchange market (Kirman, 1993). According to Barberis and Thaler (2003), behavioral finance argues that some financial phenomena can be considered using techniques in which some agents are not completely rational. The field has two building blocks including limits to arbitrage, which argues that it is not easy for rational traders to undo the dislocations caused by less rational traders; and psychology, which catalogues the types of deviations from full rationality we might anticipate to see.

* Corresponding author.
E-mail addresses: ramezani_chahardah@yahoo.com (Z Ramezani Chahardah)

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Chang et al. (2000) investigated the investment behavior of market participants within various international markets (i.e., US, Hong Kong, Japan, South Korea, and Taiwan), specifically in terms of their tendency to indicate herd behavior. They stated that there had been no evidence of herding on the part of market participants in the US and Hong Kong and partial evidence of herding in Japan. Nevertheless, they found some evidence of herding behavior for South Korea and Taiwan, the two emerging markets in their study.

Christie and Huang (1995) investigated whether equity returns indicated the presence of herd behavior on the part of investors during periods of market stress or not. They used the cross-sectional standard deviation of returns, or dispersion to examine this hypothesis and to capture herd behavior. When individual returns herd around the market consensus, dispersions were anticipated to be relatively low. However, rational asset pricing models could predict an increase in dispersion because individual returns were reacted away from the market return when stocks varied in their sensitivity to market movements. In their survey, the results for both daily and monthly returns were inconsistent with the presence of herding during periods of large price movements.

Fuller (1998) provided a general discussion of behavioral finance and presents some insights from this field that apply to the problems plan sponsors encounter when evaluating and choosing active equity managers. Lakonishok et al. (1992) implemented new data on the holdings of 769 tax-exempt (predominantly pension) funds, to assess the potential impact of their trading on stock prices. They explained two characteristics of trading by these money managers: herding, which refers to buying (selling) simultaneously the same stocks as other managers buy (sell), and positive-feedback trading, which referred to purchasing past winners and selling past losers. These two aspects of trading were commonly a part of the argument that institutions destabilized stock prices. The evidence recommended that pension managers did not strongly pursue these potentially destabilizing practices. According to Manski (2000) investigated why and discussed how economists might make sustained contributions to the empirical analysis of social interactions.

2. The proposed study

The proposed study of this paper investigates investors' behavior on creating herding behavior when they face with various levels of uncertainty on available information on the market. The survey designs a questionnaire, distributes it among some investors, and analyzes the results. In our survey, we have distributed the questionnaire among 150 professional investors who were involved in investment on shares of different firms listed on Tehran Stock Exchange. After analyzing the feedbacks, we have set aside 45 questionnaires, which were not filled, properly and analyzed the remaining 105 questionnaires. There are two main hypotheses associated with the proposed study of this paper as follows,

1. When the level of uncertainty increases, herding behavior increases too.
2. The relationship between behavior bias and herding behavior yields to the following,

    1. Illusion of control bias (ILC) favors herding,
    2. Overconfidence bias (OC) reduces herding,
    3. Self-attribution bias (SA) reduces herding,
    4. Hot-hand fallacy (HHF) encourages herding,
    5. Gambler's fallacy (GF) inhibits herding.

3. Investors' under reaction to new information explains herding conditioned by information uncertainty.

Herding behavior (HERD) is the dependent variable of this study and it is defined in six categories as follows,

1. HERD1 FT: herding behavior under high level of uncertainty with fewer numbers of previous trades.
2. HERD2 FT: herding behavior under average level of uncertainty with fewer numbers of previous trades.
3. HERD3 FT: herding behavior under low level of uncertainty with fewer numbers of previous trades.
4. HERD1 MT: herding behavior under high level of uncertainty with higher numbers of previous trades.
5. HERD2 MT: herding behavior under average level of uncertainty with higher numbers of previous trades.
6. HERD3 MT: herding behavior under low level of uncertainty with higher numbers of previous trades.

The independent variables are Illusion of control bias (ILC) favors herding, Overconfidence bias (OC) reduces herding, Self-attribution bias (SA) reduces herding, Hot-hand fallacy (HHF) encourages herding and Gambler's fallacy (GF) inhibits herding.

3. The results

In this section, we present the results of testing various hypotheses of this survey.

3.1. The first hypothesis

To test the first hypothesis, we use Wilcoxon nonparametric test. Table 1 demonstrates the results of our survey.

Table 1
The results of testing the first hypothesis

Present information	Mean	Sig
HERDFT1 - HERDFT2	-0.39048	0
HERDFT1 - HERDFT3	-0.21905	0
HERDFT1 - HERDMT1	-0.09524	0.003
HERDFT1 - HERDMT2	-0.65714	0
HERDFT1 - HERDMT3	-0.45714	0
HERDFT2 - HERDFT3	0.17143	0
HERDFT2 - HERDMT1	0.29524	0
HERDFT2 - HERDMT2	-0.26667	0
HERDFT2 - HERDMT3	-0.06667	0.239
HERDFT3 - HERDMT1	0.12381	0.001
HERDFT3 - HERDMT2	-0.4381	0
HERDFT3 - HERDMT3	-0.2381	0
HERDMT1 - HERDMT2	-0.5619	0
HERDMT1 - HERDMT3	-0.3619	0
HERDMT2 - HERDMT3	0.2	0

As we can observe from the results of Table 1, in 14 out of 15 cases, there are some meaningful relationships between two components. However, we do not know whether the relationship is positive or negative and we may extend our investigation by looking to the results shown in Fig 1. As we can observe from the results of Fig. 1, herding effect is higher when the numbers of trades are in average level. In addition, we have performed Spearman correlation test between each pairs of data and Table 2 demonstrates the summary of our correlations.

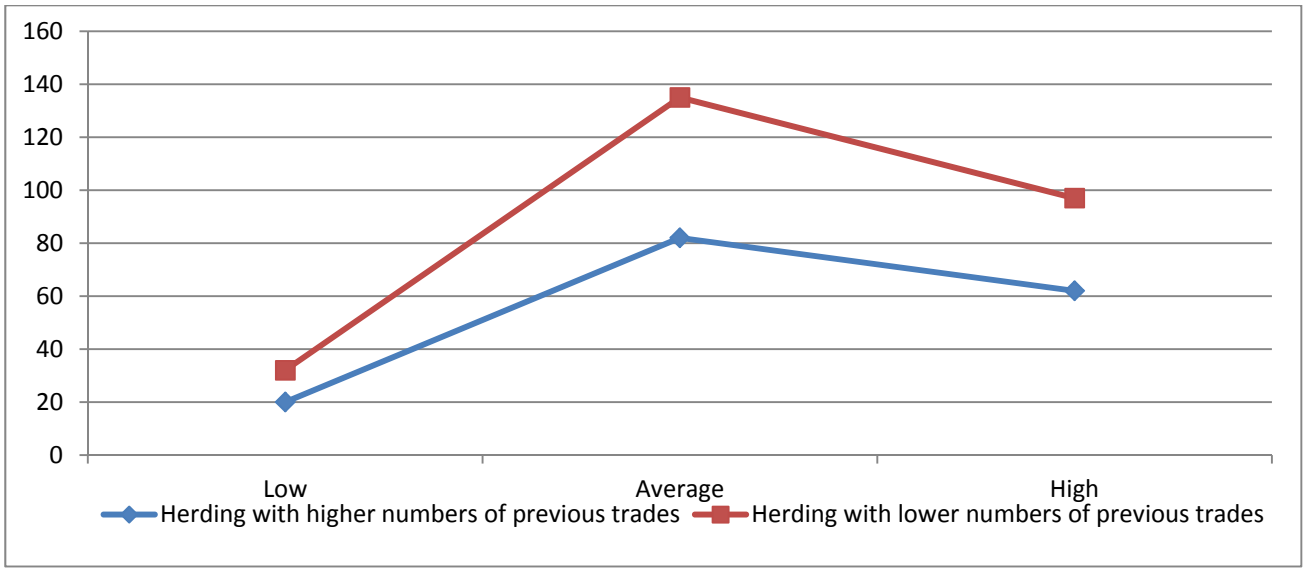

Fig. 1. Herding with lower versus higher numbers of previous trades

Table 2
The summary of Spearman correlation test

Variable	Correlation	HERDFT1	HERDFT2	HERDFT3	HERDMT1	HERDMT2	HERDMT3
HERDFT1	Correlation Coefficient	1.000	0.356	0.508	0.624	0.196	0.130
	Sig.	.	0.000	0.000	0.000	0.046	0.188
HERDFT2	Correlation Coefficient	0.356	1.000	0.660	0.463	0.550	0.335
	Sig.	0.000	.	0.000	0.000	0.000	0.000
HERDFT3	Correlation Coefficient	0.508	0.660	1.000	0.678	0.385	0.449
	Sig.	0.000	0.000	.	0.000	0.000	0.000
HERDMT1	Correlation Coefficient	0.624	0.463	0.678	1.000	0.280	0.304
	Sig.	0.000	0.000	0.000	.	0.004	0.002
HERDMT2	Correlation Coefficient	0.196	0.550	0.385	0.280	1.000	0.537
	Sig.	0.046	0.000	0.000	0.004	.	0.000
HERDMT3	Correlation Coefficient	0.130	0.335	0.449	0.304	0.537	1.000
	Sig.	0.188	0.000	0.000	0.002	0.000	.

As we can observe from the results of Table 2, there are some positive and meaningful correlation between uncertainty and herding level but our results indicate that herding level is relatively high when the uncertainty is on average level. Therefore, we can confirm the first hypothesis of this survey since there is not a linear and straight relationship between uncertainty and herding behavior.

3.2. The second hypothesis

To test the second hypothesis of this survey we first perform ANOVA test. Table 3 demonstrate the results of our findings.

Table 3
The summary of ANOVA test

Var.	High uncertainty				moderate uncertainty				low uncertainty			
	Few T		Many T		Few T		Many T		Few T		Many T	
	F	Sig	F	Sig	F	Sig	F	Sig	F	Sig	F	Sig
ILC	0.766	0.384	0.131	0.718	12.754	0.001	6.254	0.014	0.034	0.0853	2.114	0.149
OC	6.902	0.010	19.453	0.000	21.109	0.000	52.954	0.000	40.387	0.000	115.991	0.000
SA	5.535	0.021	0.427	0.515	5.337	0.023	13.779	0.000	0.305	0.582	0.013	0.911
GF	1.579	0.212	3.297	0.072	13.949	0.000	67.233	0.000	6.401	0.013	12.774	0.001
HHF	12.556	0.001	22.767	0.000	43.309	0.000	27.128	0.000	60.509	0.000	69.474	0.000
UR	9.281	0.003	21.067	0.000	76.110	0.000	88.632	0.000	31.363	0.000	32.594	0.000

The results of Table 3 indicate that when the level of uncertainty is moderate, we see some meaningful relationship between herding behavior and uncertainty. Next, we perform logistic regression analysis to investigate the relationship between independent variables and herding behavior as dependent variable. Table 4 summarizes the results of our investigation.

Table 4
The summary of Logistic regression

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
ILC	0.342	0.227	1.523	1	0.217	1.408
OC	0.767	0.268	8.161	1	0.004	0.464
SA	0.229	0.205	1.247	1	0.264	1.257
GF	-1.789	1.042	2.952	1	0.086	0.167
HHF	1.169	0.257	20.641	1	0.000	3.220
UR	-1.339	0.249	28.881	1	0.000	0.0626
Constant	-0.441	0.290	2.321	1	0.128	0.643

For the sake of simplicity, we state the relationship in Eq. (1) as follows,

$$HERD= \; - 0.441 + 0.342ILC - 0.767OC + 0.229SA - 1.789GF + 1.169HHF - 1.339UR \qquad (1)$$

The first coefficient associated with ILC is not statistically significant when α=5% or even α = 10%. Therefore, we cannot reject the hull hypothesis. The second coefficient is related to OC with Sig=0.004 and this means we can reject the null hypothesis and conclude that an increase in overconfidence bias reduces herding behavior. The third coefficient is associated with Self-attribution bias (SA). The coefficient is not statistically significance and we cannot reject the null hypothesis associated with this hypothesis. The fourth hypothesis is associated with Hot-hand fallacy (HHF) and the coefficient associated with this variable is statistically significant. Therefore, we can reject the null hypothesis. Finally, the coefficient of Gambler's fallacy (GF) is meaningful when the level of significance is 10 percent.

3.3. The third hypothesis

The third hypothesis of this survey investigates whether investors' under reaction to new information explains herding conditioned by information uncertainty. To verify this hypothesis, we look at the coefficient of UR in Eq. (1). Since this variable is significance we can reject the null hypothesis and accept confirm this relationship.

4. Conclusion

In this paper, we have presented an empirical investigation to study the relationship between uncertainty and herding behavior. The proposed study setup three hypotheses and using different statistical methods such as Spearman correlation test, Logistic regression, etc. we have investigated the effects of uncertainty under various conditions. The results of our survey are consistent with what Chang et al. (2000) presented earlier on some Far East stock exchange.

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