The Impact of Salience on Investor Expectation:
Evidence from Stock Price Forecasting Website

September 26, 2021

Nana Otsuki[1]   Seiichiro Iwasawa[2]

Abstract

Using a unique dataset provided by a Japanese company, Minkabu The Infonoid, Inc. (MTI), running Social Networking Service for individual investors, we examine impact of salience of information on investor expectation. In our setting, an individual investor can fill in her individual stock price forecast on the webpage, and in doing so, she can see potentially salient information: the stock's consensus price forecast among other individual investors. We use an event when the webpage display of the stock's consensus price forecast significantly changed and became less visually salient as a natural experiment opportunity, and show that, after the event, investors became less sensitive to the stock's consensus price forecast. We also find that an investor, in forming her forecast, is more sensitive to extremely high value of the stock's consensus price forecast than to its medium value. To confirm that physical attention underlies our results, we run an experiment in which subjects forecast individual stock price while seeing the webpage replicated exactly like the ones provided by MTI. We find that subjects look at the stock's consensus price forecast for longer time period when they see the webpage before the salience shock than the one after the event, and that they look at the extremely high value of the stock's consensus price forecast for longer time period than its medium value. Our results are consistent with the salience theory proposed by Bordalo, et al. (2012), and provide a direct evidence that investor expectation is influenced by salience of information.

Keywords: salience, investor expectation, individual investors
JEL classification: G11, G17, G41

1. Introduction

In recent years, a growing literature in economics has studied the role of salience in economic choice, both theoretically and empirically. In theoretical front, Bordalo, et al. (2012, 2013, 2020) present models of salience in economic choice. In their models, economic choices of agents are distorted by the salience of information. In empirical front, Frydman and Wang (2020), using the

salience shock event, find that the shock causally increases the disposition effect of the investor. Similarly, Shaton (2016) find that the salience shock causes reduction in investors' fund flow sensitivity to past returns.

While data on information and choices provided by those empirical researches are consistent with the salience theory, they offer no direct evidences of physical mechanism of salience. To do so, a researcher needs to measure attention, and, to date, various researchers have used eyetracking data in experimental setting, to show impact of salience on economic decisions (Pieters and Warlop 1999, Shimojo et al. 2003, Krajbich et al. 2010, Krajbich and Rangel 2011, Frydman and Mormann 2017).

In this paper, we combine a field evidence which suggests causal influence of salience on economic decision, and experimental result which shows that the physical mechanism of salience underlies the field evidence.

2. Data and Natural Experiment

We use data provided by a Japanese company, Minkabu The Infonoid, Inc. (henceforth MTI), running Social Networking Service for individual investors. The website run by the company, called Minkabu (abbreviation of "Minna-no-Kabushiki," meaning "stocks for people" in Japanese), offers variety of stock market information. One key feature of the website is that an investor, once registering for the website, can fill in her forecast price of a stock listed in the Stock Exchanges in Japan. The website operator calculates the average of such forecast made over the past six months for each stock, and shows it on the site as "(average) forecast (price) of individual investors," which we call Minkabu consensus forecast (MCF) henceforth. The dataset provided by MTI includes such a stock price forecast made by each investor, and Minkabu consensus forecast she looks at during when she forecast, from March 2007 to July 2019.

When an investor intends to fill in her stock price forecast on the Minkabu website, she needs to click a "forecast" tab on the webpage. In October 2017, Minkabu website changed the webpage display an investor saw when she clicked the "forecast" tab. Before September 2017, MCF was displayed at the top right, and also at the bottom right. In left-hand side picture of Figure 1, those parts are shown titled "予想株価." In contrast, after September 2017, MCF was not shown at the top, but only at the middle of the bottom, along with a stock's consensus price forecast among professional analysts. In tight-hand side picture of Figure 1, those parts are shown titled "個人投資家の予想."

We conjecture that an information of MCF is potentially salient for investors who are about to fill in their own forecasts, based on evidences showing individual investors herd other individual investors (e.g., Barber et al. 2009). At the same time, we consider that salience of the MCF information decreased after October 2017, and use this salience shock event as an

opportunity of natural experiment.

Figure 1　Minkabu webpage display before (lhs) and after (rhs) September 2017

Note: Each of the picture above is an illustration of a Minkabu webpage before and after September 2017, which investors saw when they clicked to fill in their stock price forecasts.

3.　Hypothesis, Empirical Strategy, and Results

Using our data, we test two hypotheses, both of which are derived from the salience theory. Our first hypothesis is that individual investors' expectation becomes less sensitive to MCF, after visual salience of the MCF information declines (H1). The second hypothesis is that individual investors' expectation is more sensitive to extremely high MCF than to medium MCF (H2).

To test the impact of salience on investor expectation, we analyze a Minkabu investor's forecast return. However, merely regressing the Minkabu investor's forecast return on some salient information is not enough to detect the distortive impact of salience on investor expectation, since the salient information may also include fundamentally relevant one. To overcome this problem, as a dependent variable, we use the difference between Minkabu investor i's forecast return of stock a and stock a's corresponding realized return, and Minkabu investor j's forecast return of stock $a*$, which is stock a's characteristically matched stock, instead of Minkabu investor i's forecast return of stock a. Specifically, we run the following regressions (1)-(2) to test

3

H1, and (3)-(4) to test H2.

$$Ln\left(\frac{F_t^i[P_{t+n}^a|S_t^a]}{P_t^a}\right) - Ln\left(\frac{P_{t+n}^a}{P_t^a}\right) = \alpha^1 + \beta_1^1 MCF_t^a + \beta_2^1 * POST + \beta_3^1 * POST * MCF_t^a + \varepsilon_t^1 \tag{1}$$

$$Ln(\frac{F_t^i[P_{t+n}^a|S_t^a]}{P_t^a}) - Ln(\frac{F_t^j[P_{t+n}^{a*}]}{P_t^{a*}}) = \alpha^2 + \beta_1^2 S_t^a + \beta_2^2 * POST + \beta_3^2 * POST * MCF_t^a + \varepsilon_t^2 \tag{2}$$

$$Ln\left(\frac{F_t^i[P_{t+n}^a|S_t^a]}{P_t^a}\right) - Ln\left(\frac{P_{t+n}^a}{P_t^a}\right)$$

$$= \alpha^3 + \beta_1^3 MCF_t^a + \beta_2^3 MCF^{100,75} + \beta_3^3 MCF^{75,50} + \beta_4^3 MCF^{50,25} + \beta_5^3 MCF^{100,75} * MCF_t^a$$

$$+ \beta_6^3 MCF^{75,50} * MCF_t^a + \beta_7^3 MCF^{50,25} * MCF_t^a + \varepsilon_t^3 \tag{3}$$

$$Ln(\frac{F_t^i[P_{t+n}^a|S_t^a]}{P_t^a}) - Ln(\frac{F_t^j[P_{t+n}^{a*}]}{P_t^{a*}})$$

$$= \alpha^4 + \beta_1^4 MCF_t^a + \beta_2^4 MCF^{100,75} + \beta_3^4 MCF^{75,50} + \beta_4^4 MCF^{50,25} + \beta_5^4 MCF^{100,75} * MCF_t^a$$

$$+ \beta_6^4 MCF^{75,50} * MCF_t^a + \beta_7^4 MCF^{50,25} * MCF_t^a + \varepsilon_t^4 \tag{4}$$

In the equations (1)-(2), P_t^a denotes price of stock a at time t, $F_t^i[P_{t+n}^a|S_t^a]$ denotes investor i's n-period ahead forecast price of stock a at time t, given salient information of stock a at time t, $F_t^j[P_{t+n}^{a*}]$ denotes investor j's n-period ahead forecast price of stock a at time t, MCF_t^a denotes potentially salient information on stock a at time t, $POST$ denotes a dummy variable for a period after October 2017, and X_t^i denotes attributes of investor i at time t. In equations (3)-(4), $MCF^{100,75}$, $MCF^{75,50}$, and $MCF^{50,25}$ are dummy variables for top, second, and third quartiles of MCF, respectively.

Results are shown in Tables 1 and 2. In Table 1, in both specifications (1) and (2), coefficients on MCF are positive and statistically significant, but coefficients of interaction term $POST \times MCF$ are negative and statistically significant. The result is consistent with H1. In Table 2, in both specifications (3) and (4), coefficients of interaction term $MCF^{75,100} \times MCF$ are positive and statistically significant, and coefficient of $MCF^{75,100} \times MCF$ is higher than that of $MCF^{50,75}$ or of $MCF^{25,50}$. The result is consistent with H2.

Table 1 Causal influence of salience (H1)

	(1)	(2)
MCF	0.355***	0.259***
	(0.0094)	(0.0229)
$POSTxMCF$	-0.204***	-0.218***
	(0.0183)	(0.0332)
Fixed Effect - ID	Yes	Yes
Fixed Effect - Time	Yes	Yes
Obs.	76,409	27,219
adj. R-sq	0.364	0.299

Table 2 Influence of extreme forecast (H2)

	(3)	(4)
MCF_t	0.123***	0.00844***
	(0.0140)	(0.0313)
$MCF^{75,100}$	-0.225***	-0.241***
	(0.0146)	(0.0361)
$MCF^{50,75}$	-0.248*	0.0312
	(0.0182)	(0.0456)
$MCF^{25,50}$	-0.0118	0.0122
	(0.00885)	(0.0219)
$MCF^{75,100} xMCF_t$	0.527***	0.478***
	(0.0230)	(0.0580)
$MCF^{50,75} xMCFt$	0.175***	-0.163
	(0.0592)	(0.147)
$MCF^{25,50} xMCF_t$	0.0981	-0.154
	(0.0610)	(0.159)
Fixed Effect - ID	Yes	Yes
Fixed Effect - Time	Yes	Yes
Obs.	76,261	27,219
adj. R-sq	0.388	0.308

4. Experiment and Results

In the analysis above, our data suggests that salient information distorts investor expectation. However, this does not necessarily mean that physical mechanism underlies the data. When Minkabu investors' expectation is influenced by salient information, do they actually pay attention to it? To explore this question, we run an experiment, in which subjects forecast a stock price while seeing the webpage replicated exactly like the ones provided by MTI.

We select subjects so that such characteristics as age and stock investment experience are, as a group, similar to those of Minkabu investors. Half of the subjects, group OLD, see the webpage similar to the one provided by MTI before September 2017, and another half of them, group NEW, see the webpage similar to the one provided by MTI after October 2017. Each of the subjects is given the computer screen showing the webpage and mouse, and asked to forecast a stock price, while browsing various information on the page. We ask subjects to keep left-clicking the mouse when each of them look at a particular information on the webpage. For each subject, we measure a length of period when she kept left-clicking a particular information, and then calculate proportion of the length during when she looks at the MCF information.

In Table 3, we show the average proportion among group OLD, and the one among group NEW. Subjects of group OLD spend 16 percent of their forecasting time on looking at the MCF, whereas those of group NEW spend only 7 percent, and the difference is statistically significant.

Then we halve each of group OLD and group NEW, and exposed half of them to medium MCF, and another half of them to extremely high MCF, while maintaining the other information. In Table 4, we show the average proportion of the length during when each subject looks at the MCF information. Subjects exposed to medium MCF spend 10.6 percent of their forecasting time on looking at the MCF, whereas those of group NEW spend 12.3 percent, although the difference is not statistically significant.

Table 3 OLD versus NEW

	Group OLD	Group NEW	Difference
Average	16.3%	6.6%	9.7%
p-value			0.00
N	129	129	

Table 4 Extremely High versus Medium MCF

	Extremely High MCF	Medium MCF	Difference
Average	12.3%	10.6%	1.7%
p-value			0.14
N	132	126	

Reference

Barber, B. M., T. Odean, and N. Zhu, 2009. Systematic noise. Journal of Financial Markets 12(4), 547-569.

Bordalo, P. N. Gennaioli, and A. Shleifer, 2012. Salience theory of choice under risk. Quarterly Journal of Economics 127(3), 1243-1285.

Bordalo, P. N. Gennaioli, and A. Shleifer, 2013. Salience and consumer choice. Journal of Political Economy 121(5), 803-843.

Bordalo, P. N. Gennaioli, and A. Shleifer, 2020. Memory, attention, and choice. Quarterly Journal of Economics 135(3), 1399-1442.

Frydman, C. and M. Mormann, 2017. The role of salience and attention in choice under risk: an experimental investigation. Working paper.

Frydman, C. and B. Wang, 2020. The impact of salience on investor behavior: evidence from a natural experiment. Journal of Finance 75(1), 229-276.

Krajbich, I., C. Armel, and A. Rangel, 2010. Visual fixations and the computation and comparison of value in simple choice. Nature Neuroscience 13(10), 1292-1298.

Krajbich, I., and A. Rangel, 2011. Multialternative drift-diffusion model predicts the relationship between visual fixations and choice in value-based decisions. Proceedings of the National Academy of Sciences 108(33), 13852-13857.

Pieters, R. and L. Warlop, 1999. Visual attention during brand choice: the impact of time pressure and task motivation. International Journal of Research in Marketing 16, 1-16.

Shaton, M., 2016. The display of information and household investment behavior. Working paper.

Shimojo S., C. Simion, E. Shimojo, and C. Scheier, 2003. Gaze bias both reflects and influences preference. Nature Neuroscience 6(12), 1317-1322.