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# Do investors hold that they know? Impact of familiarity bias on investor's reluctance to realize losses: Experimental approach



Ekaterina Bulipopova<sup>a,\*</sup>, Vladislav Zhdanov<sup>a,1</sup>, Artem Simonov<sup>b,2</sup>

<sup>a</sup> Russian Science Academy, Ural Branch, Institute of Philosophy and Law, 16 Kovalevskaya Str., Yekaterinburg 620990, Russia

<sup>b</sup> Ernst & Young LLC, Sadovnicheskaya Str. 82, Building 2, Moscow 115035, Russia

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### ABSTRACT

In this article we investigate the impact of familiarity bias on the individual investor's reluctance to realize losses. Our experimental approach reveals a strong correlation between familiarity and disposition effect. We conducted 714 tests in which different respondents could sell stocks of two types – winners and losers. One group of respondents “owned” familiar assets and another group operated anonymous portfolios. The results of the experiment show that an individual investor's tendency to ride losers too long is more than twice as high in the case of unfamiliar stocks as it is when assets are familiar to the holder.

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*Abbreviations:* PG, paper gains; PL, paper losses; RG, realized gains; RL, realized losses; PRG, proportion of realized gains; PRL, proportion of realized losses.

\* Corresponding author. Tel.: +37377766013; fax: +7 3433743355.

*E-mail addresses:* [bulipopova@ifp.uran.ru](mailto:bulipopova@ifp.uran.ru) (E. Bulipopova), [zhdanov@ifp.uran.ru](mailto:zhdanov@ifp.uran.ru) (V. Zhdanov), [Artem.Simonov@ru.ey.com](mailto:Artem.Simonov@ru.ey.com) (A. Simonov).

<sup>1</sup> Tel.: +442081333745; fax: +7 3433743355.

<sup>2</sup> Tel.: +7 985 4555 789.

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## 1. Introduction

This article asserts that familiarity bias has a strong impact on the individual investor's reluctance to realize losses.

Despite the ever multiplying number of researches on familiarity bias and disposition effect, no study has been reported to date on familiarity bias' impact on individual investor's reluctance to realize losses. Nevertheless, even classical papers on behavioral finance find root of the disposition effect in the field of human fears and mental exaggeration such as familiarity bias.

Daniel Kahneman and Amos Tversky, authors of prospect theory, posit that the disproportion in the number of purchases and sales is strongly connected with investor's loss aversion – the asymmetry between the values that people put on losses and gains. Evaluating possible losses more heavily than possible gains, an investor behaves irrationally when sells winners too soon and hold losers too long (Kahneman and Tversky, 1979; Kahneman and Riepe, 1998). This intuition is confirmed in later studies. Particularly Hersh Shefrin and Meir Statman come to similar conclusions by placing behavioral pattern labeled “disposition effect” into a wider theoretical framework which includes mental accounting, regret aversion, self-control and tax-considerations (Shefrin and Statman, 1985). Terrence Odean prove that investors' preference for selling winners and holding losers does not depend on rational considerations (Odean, 1998). Nicholas Barberis and Wei Xiong suggest that though the disposition effect is still a reliable postulate of behavioral finance, its cause remains unclear. Their original research argues that prospect theory often predicts the opposite of the disposition effect, namely that investors prefer to sell a stock trading at a paper loss more readily than one trading at a paper gain. According to Barberis and Xiong data, the disposition effect is more likely to fail when the expected risky asset return is high and when the number of trading periods is low (Barberis and Xiong, 2009).

Studies of the impact of familiarity bias on investor's behavior gradually extend the conventional understanding of the disposition effect laws. The results of recent collective research on home bias in foreign investment decisions by Dongmin Ke, Lilian Ng, and Qinghai Wang suggest that familiarity is the source of the local bias fund managers have toward foreign firms that have presence in their home country (Ke et al., 2010). Matti Keloharju, Samuli Knüpfer and Juhani Linnainmaa find a strong positive relation between customer relationship, ownership of a company, and size of the ownership stake in the sphere of brokerage and automotive industries in Finland. Analyzing daily panel data on stock holdings, trades, and broker–customer relationships of Finnish investors, they come to a conclusion that patrons of a given broker are more than twice as likely to invest in the corresponding broker stock, and have 13% larger ownership stakes conditional on investment. This evidence suggests that a customer relationship is about as important to stock selection as home bias (Keloharju et al., 2012). Another example of impact of familiarity bias on investor's behavior comes from the latest research on familiarity in American mutual fund manager portfolio choice initialized by Veronika K. Pool, Noah Stoffman and Scott E. Yonker. Authors affirm: familiarity bias becomes a “scourge” for both individual investors and professionals. Average fund outweighs stocks from its managers' home states, as managers might simply be more familiar with home-state companies, even if they have no real information about them (Pool et al., 2012).

Thus, the knowledge on the problem of familiarity' impact on reluctance to realize losers is not rich and abundant. Several researches demonstrate a correlation between familiarity bias and the disposition effect, but no one answers the question of how familiarity affects the individual investors' intentions to realize losses?

Joint work “Is the Aggregate Investor Reluctant to Realize Losses? Evidence from Taiwan” by Brad M. Barber, Yi-Tsung Lee, Yu-Jane Liu, Terrance Odean (Barber et al., 2007) served as a source of intuition for the present paper. Barber and colleagues analyze all trading activity at Taiwan Stock Exchange for five years ending in 1999. Using a dataset that contains all trades (over one billion) and the identity of every trader (nearly four million), they quantify the extent to which investors sell losers and winners (relative to the opportunities to sell each). The main finding is that investors in Taiwan are about twice as likely to sell a stock if they are holding that stock for a gain rather than a loss. One detail mentioned by the authors became a trigger for our research: although 84% of all

investors realize gains at a faster rate than losses, foreigners behave more rationally and willingly sell both winners and losers. For foreign investors the percentage of gains realized ( $PRG = RG/(PG + RG)$ ) is 1.00; and same indicator of losses realized ( $PRL = RL/(PL + RL)$ ) is 1.15 (Table 3 at Barber et al., 2007). The final figure for  $PRG - PRL$  equals  $-0.15$ , whereas for all investors it is  $7.08$  (reliably different from zero (or 50%) at 1% significance level). Thus the final index for foreigners significantly differs from the average one. Foreign investors tend to sell losers or winners in a more rational way, so that the disposition effect does not apply. A likely explanation for this phenomenon is that foreigners are less familiar with Taiwanese stocks and loss realization is not emotionally painful for them. As for Taiwanese investors, familiarity bias increases their reluctance to realize losses.

The main objective of the present paper is to test the hypothesis that an investor managing familiar assets is more reluctant to realize losses. In order to check it we developed and implemented a special experiment. First, we created a personal website – <http://finance.z-marketing.ru> – and placed there a trading simulator. By means of social networks and blogs we invited all kinds of people to take part in the trading. If person won, we would pay the prize money. The purpose of this experiment declared to the participants was “to win at trading”, so that the real purpose was hidden from the respondents without affecting experimental results.

## 2. Material and methods

### 2.1. Material

In order to investigate the influence of familiarity bias on an individual investor's behavior in context of the disposition effect we conducted an experiment on August 22nd through 28th 2013 by publishing a link on the personal website <http://finance.z-marketing.ru> on Facebook. We promised to pay real money to everyone who could beat the experimental market. Some of our friends and students shared the link at Facebook and livejournal.com.

Two types of portfolios – a basket of ten well-known commodities and ten anonymous assets – were randomly offered to everyone who visited the website.

Ten well-known commodities – Oil, Gold, Platinum, Silver Aluminum, Copper, Sugar, Corn and Coffee were chosen mainly to avoid any misunderstanding for stocks issuers – if we had used international blue-chips such as Apple or Sony for this purpose. Simple pictures were used to increase familiarity. An example of commodities' portfolio was presented at the main page in order to raise familiarity bias.

The anonymous portfolio consisted of ten 3-letter symbols – e.g. XYZ.

Simple trading rules were explained at the main website page and comprised of following conditions:

- The initial price of each asset is \$10.
- Each respondent can only play once, with no second attempt.
- The portfolio type (familiar or anonymous) is randomly given.
- A game for each asset consists of 11 rounds of price fluctuations. The first prices are already given.
- The variation in price is \$1 up or down.
- A respondent can only sell or hold the assets, buying was not allowed.

As a result, 714 unique respondents were divided into two groups based on the randomly given portfolio. 361 of them operated familiar commodities portfolio, while 353 held anonymous ones.

There was only one respondent under 18. Respondents were mostly from Russia and UK, with the addition of a few other countries. Men and women participated equally.

#### 2.1.1. The price fluctuation process

First of all, the price fluctuations were random for every time randomly chosen five assets of the portfolios, with equal probability to rise by \$1, to fall by \$1, and to stay the same. Other five assets of the first portfolio correlated absolutely negatively with randomly fluctuated assets. For instance,

if Oil rose up by \$1, Sugar fell by \$1, if XYZ went down or stayed the same, ZXY rose or stayed respectively. So the sum of all assets was always \$100. As it was mentioned above, the pairs of assets in each portfolio type – either familiar or anonymous – were randomly formed for every respondent.

Secondly, in order to divert respondents from the real aim of the experiment and enhance their motivation, we created a false target – to beat simulator. It was not easy to notice any price correlation, but still there were a lot of comments from respondents arguing that they “found the systems”, and one of them was even ready to return his money reward to us. Nevertheless, the real goal of the experiment was out of respondent’s attention, so we could say that the results of respondents’ operation with randomly price fluctuated portfolios reflected normal individual investors’ behavior on financial markets.

### 2.1.2. Verification

The full list of all 714 respondents with their nicknames, phone/emails, IP and results is available on <http://finance.z-marketing.ru/resultsAug.html>. In order to prevent any abuse for our respondents, letters XXX were used to camouflage their contacts and names. The full list of respondents information is available for verification on demand. A few respondents did not put their nicknames, but we do have at least a unique IP for them. About half of respondents were not asked to provide their phone/emails because they did not beat the experimental market or they missed this space in the form guided by scientific considerations even if they won. Only winners put their phone/emails (PayPal) in order to get money (from \$1 to \$14) from our team. We carefully checked information on every respondent to exclude any possibility of a replay by the same person.

### 2.2. Methods

The main part of the methodology – the measurement of the reluctance to realize losses – is based on the study by Barber et al. (2007). They successfully implemented a simple but effective method to investigate an investor’s behavior analyzing a vast number of Taiwanese stock exchange transactions. Our experiment was designed especially to be used in conjunction with Barber et al. approach to measure the disposition effect.

**Table 1**  
Example of market game report for respondent N. Asset type: Anonymous.

Action	Assets	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sold	XZZ	10	9	8	7	6	7	6	5	4	4	5	4
Sold	YXX	10	9	9	8	9	10	11	12	13	14	14	15
Sold	XZY	10	11	11	12	13	13	14	13	12	11	11	10
Unsold	ZXX	10	11	10	11	11	11	10	9	9	9	10	10
Sold	XYZ	10	9	9	8	9	10	9	8	8	8	8	9
Unsold	YZX	10	11	12	12	11	11	12	11	12	13	14	15
Unsold	ZYY	10	9	9	10	10	9	8	9	8	7	6	7
Sold	ZXY	10	11	10	11	11	10	11	12	13	12	11	10
Unsold	ZYX	10	9	10	10	9	8	7	8	8	9	8	7
Sold	YXZ	10	11	12	11	11	11	12	13	13	13	13	13

The method represented a sequence of actions. Each market game of every investor is broken up into stocks held for gains and stocks held for losses. Then we analyzed the results of this investor's selling activity and finally calculated the proportion of his winners sold and the proportion of his losers sold by such formulas:

$$\text{Proportion of Realized Gains (PRG)} = \text{Realized Gains (RG)}/\text{Paper Gains (PG)}$$

$$\text{Proportion of Realized Losses (PRL)} = \text{Realized Losses (RL)}/\text{Paper Losses (PL)}$$

The experimental aim was to detect a distinction between differences of PRG and PRL for owners of familiar and anonymous portfolios using the methodology described above.

Let's consider the asset ZXX in the middle of Table 1. It increased three times by \$1 (Feb, Apr, Nov), and decreased three times by \$1 (March, July, Aug), but it was not sold. For this asset Paper Gain is \$3, Paper Loss is \$3, Realized Gain and Realized Losses are zero because these assets were not sold. Proportion of Realized Gain (PRG) and Proportion of Realized Losses (PRL) are also zero for this asset for the particular respondent.

Analyzing asset YXZ (the last one), we can notice that it showed \$4 of the Paper Gain and \$1 of Paper Loss when it was sold in August at \$13. So Realized Gain was \$1 and Realized Loss was zero. Hence the difference between Proportion of Realized Gain and Proportion of Realized Losses was  $(\$1/\$4 - \$0/\$1)$ , or 25% for this particular asset for the particular respondent. Even if the price was up and down later, this difference became unchangeable because our respondent had sold this asset.

We can thus calculate differences between PRG and PRL for each asset, to sum them and to divide by number of assets (ten in our case) under respondent's management.

$$\text{AVG (PRG-PRL)} = ((\text{PRG-PRL}) \text{ asset 1} + (\text{PRG-PRL}) \text{ asset 2} + \dots + (\text{PRG-PRL}) \text{ asset 10})/10$$

For this particular portfolio the average difference was  $(-50\% - 50\% + 0\% + 0\% - 100\% + 0\% + 0\% + 20\% + 0\% + 25\%)/10 = (-15.5\%)$ , so we can conclude that this respondent preferred to sell losers and keep winners and s/he was not reluctant to realize losses during this experiment.

Generally, PRG and PRL are greater than or equal to zero, these numbers cannot be negative. If PRG or PRL are equal to zero, it means that asset was not sold. If PRG or PRL are greater than zero, it means that some asset or assets was/were realized. In the case of  $(\text{PRG-PRL})$  is equal to zero investors behave rationally, i.e. willingly realize both gains and losses. Positive number of  $(\text{PRG-PRL})$  indicates that the investor tends to sell more winners and hold losers. Negative number of  $(\text{PRG-PRL})$  means that the investor sells more losers than winners. In other words, let's imagine the situation when some investor owns a portfolio with two assets and the price of the first asset rises while the price of the second one reduces. This investor sells the first asset and holds the second asset, so the number of  $(\text{PRG-PRL})$  is 100% and it is greater than zero. This result suggests that the investor does not recognize the loss. So, the positive difference between PRG and PRL pointed out to the fact that the respondent was reluctant to realize losses.

It's very important to mention that  $(\text{PRG-PRL})$  is an appropriate measure of investor's reluctance in our case. This is confirmed by the fact that price movements between two randomly chosen halves of assets are perfectly negatively correlated, and jointly independent between periods.

The abovementioned nature of assets price evolution eliminates the bad luck investor who experiences mostly bad shocks and vice versa. So, we can consider  $(\text{PRG-PRL})$  a relevant measure of the investor's reluctance because of specific construction of the price processes.

### 3. Results and discussion

We did not record transactions of assets where the price did not change before they were sold (neutral transaction), but 4290 transactions were made by respondents with either a gain or loss. All participants were motivated to trade profitably and more than five out of ten respondents received from \$1 to \$14 from our academic team.

Using Excel and Eviews, we analyzed 361 and 353 familiar and anonymous portfolios respectively, which both were under management of our respondents. Calculations revealed that the average difference between PRG and PRL for the number of respondents who held familiar portfolios was 5.01% and the average difference between PRG and PRL for the number of anonymous portfolios' holders was 2.29%. It indicates that individual investors who managed familiar assets portfolio were 2.18

times more reluctant to realize losses than those who owned the anonymous assets portfolio. Thus these results confirmed our hypothesis that an individual investor's reluctance to realize losses would significantly increase if they were familiar with the assets.

The significance of this study is in providing the very first evaluation of the familiarity impact on investors' willingness to realize losses. It can be helpful for both an investor who is making a risky decision and for an assets' owner who is interested in shareholders not selling shares when the market price is going down. The proved fact of aforementioned correlation being implemented in investment practice means that even such a simple measure as regular informing shareholders about the company issues may increase their reluctance to sell shares at lower market prices. As a consequence, the familiarity bias can help to steady stock prices.

#### 4. Conclusion




We have conducted an experiment to analyze the impact of the familiarity bias on the individual investor's reluctance to realize losses. The sample was made up of 714 respondents found through social networks and blogs. The vast majority of respondents were adults, mainly from Russia and the UK, both male and female. The stock market activity was simulated at the special website, and respondents were able to sell or hold assets belonging to their individual portfolios.


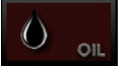



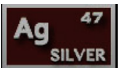

The experimental market conditions were simulated in order to check Barber and colleagues' results for the reluctance to realize gains/losses which were received from the Taiwanese stock market. The key question was: "Why were the overseas individual investors on the Taiwanese stock market less reluctant to realize losses than native individuals?" The hypothesis was that familiarity bias increased an investor's reluctance to realize losses. We believe that we have managed to confirm it with a high level of confidence. The difference between the proportion of realized gains and the proportion of realized losses is the measure of reluctance to realize losses. This method was implemented to analyze experimental results and it can be verified by any other researchers.

The respondents who held the familiar assets were found to be more than twice as reluctant to realize losses in comparison with holders of the anonymous assets. On the average, the differences between the proportion of realized gains and the proportion of realized losses were 5.01% and 2.29% for familiarity assets holders and for anonymous assets holders, respectively. Thus, our hypothesis was fully confirmed experimentally. The research results can be successfully implemented in the field of market trade and investments. Since familiarity increases an investor's reluctance to sell losers, it could significantly protect issuer's market capitalization. The holders of familiar stocks are able to support price and probably to prevent prices from plummeting. Accordingly, by means of regular and credible provision of information to shareholders, company managers can reduce the amount of panic selling in the fall of market prices or in times of crisis.

#### Appendix A

Example of full market games reports for random respondents. Asset type: familiar.

Action	Assets	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Unsold	 Corn	10	9	10	10	10	10	9	9	8	8	7	7
Sold	 Aluminum	10	9	8	9	8	8	7	8	7	7	8	7
Sold	 Sugar	10	9	8	9	10	11	12	13	13	14	14	14

Action	Assets	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sold	<b>Copper</b> 	10	11	12	13	14	15	15	14	15	16	16	17
Unsold	<b>Oil</b> 	10	11	10	9	9	10	10	9	9	9	9	9
Unsold	<b>Coffee</b> 	10	11	12	11	10	10	10	9	10	10	11	11
Sold	<b>Wheat</b> 	10	10	9	9	8	7	7	6	7	6	5	5
Unsold	<b>Gold</b> 	10	9	10	10	11	11	10	11	10	9	9	10
Unsold	<b>Silver</b> 	10	11	10	9	9	8	9	9	10	9	8	7
Sold	<b>Platinum</b> 	10	10	11	11	11	10	11	12	11	12	13	13

## Appendix B

Brief experimental results.

First portfolio type	Number of respondents	$\Sigma RG$	$\Sigma RL$	$(\Sigma RG + \Sigma RL)/N$	$\Sigma(PRG - PRL)^*$
Anonymous	353	1151	960	5.98	2.29%
Familiar	361	1273	906	6.04	5.01%

\* RG – realized gains; RL – realized losses; PRG – proportion of realized gains; PRL – proportion of realized losses.

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