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The disposition effect and investor experience

Newton Da Costa Jr. [a,b,*], Marco Goulart [b], Cesar Cupertino [b], Jurandir Macedo Jr. [c], Sergio Da Silva [a]

[a] Graduate Program in Economics, Federal University of Santa Catarina, 88040-970 Florianopolis, SC, Brazil
[b] Graduate Program in Business, Federal University of Santa Catarina, 88040-900 Florianopolis, SC, Brazil
[c] Department of Knowledge Engineering, Federal University of Santa Catarina, 88040-900 Florianopolis, SC, Brazil

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ABSTRACT

We examine whether investing experience can dampen the disposition effect, that is, the fact that investors seem to hold on to their losing stocks to a greater extent than they hold on to their winning stocks. To do so, we devise a computer program that simulates the stock market. We use the program in an experiment with two groups of subjects, namely experienced investors and undergraduate students (the inexperienced investors). As a control procedure, we consider random trade decisions made by robot subjects. We find that though both human subjects show the disposition effect, the more experienced investors are less affected.

1. Introduction

The disposition effect is the anomaly that investors seem to hold on to their losing stocks to a greater extent than they hold on to their winning stocks (Schlarbaum et al., 1978; Shefrin and Statman, 1985; Weber and Camerer, 1998). For instance, data from a consulting retail brokerage house revealed that stocks with positive returns were 68% more likely to be sold than those with negative returns (Odean, 1998). The disposition effect is lessened if there is financial counseling (Taylor, 2000; Shapira and Venezia, 2001), and it is heightened for inexperienced investors (Grinblatt and Keloharju, 2001; Coval and Shumway, 2005; Feng and Seasholes, 2005; Locke and Mann, 2005; Dhar and Zhu, 2006), though that is still unsettled (Chen et al., 2007). Here, we investigate the relationship between the disposition effect and investing experience using a "framed field experiment" (Harrison and List, 2004).

Tests proving the disposition effect in actual markets (such as those in the works above) cannot be conclusive because investor decisions cannot be controlled in there. For that reason, lab experiments can be more illuminating in that they can be designed to match individual investors' trading decisions with the prices at which they buy or sell stocks. In stark contrast with the above studies using actual data, when it comes to the lab the disposition effect may be even higher for experienced investors (like in the "artefactual field experiments" of Haigh and List (2005) and of Abbink and Rockenbach (2006)). That can be explained by either the curse of knowledge ("the more you know, the worse you become at using that knowledge") (Camerer et al., 1989), the desire to avoid regret (Barber and Odean, 1999), or simply by the fact that an experiment is too simplistic.

Because it is possible that the relationship between the disposition effect and investing experience can be dependent on experiment design, here we try to remedy such a deficiency by developing a computer program that mimics the stock market while retaining the characteristic that investor decisions cannot influence the (exogenous) stock prices. We use the program in an experiment with two groups of subjects, namely experienced investors and undergraduate students (the inexperienced investors). As a control procedure, we also consider random trade decisions made by robot subjects. We thus set a more complex experimental environment than does a typical experiment while preserving the control characteristics that are the edge of the experimental method. As a result, we find the disposition effect in human subjects, and also that experienced investors are less prone to the effect, which is in line with most of the evidence discussed above for actual data.

Harrison and List (2004) put forward the following taxonomy to classify experiments: (1) conventional lab experiment; (2) artefac-

* Corresponding author at: Graduate Program in Economics, Federal University of Santa Catarina, 88040-970 Florianopolis, SC, Brazil. Tel.: +55 48 9976 8430; fax: +55 48 3721 9901.

E-mail addresses: newton@cse.ufsc.br (N. Da Costa Jr.), marcofloripa@gmail.com (M. Goulart), cupertino.cmc@gmail.com (C. Cupertino), jurandir.sell.macedo@ufsc.br (J. Macedo Jr.), professorsergiodasilva@gmail.com (S. Da Silva).

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Table 1
Selected recent work related to the disposition effect and investor experience.

Author	Result
Menkhoff and Nikiforow (2009)	Fund managers who have strong incentives to learn efficient behavior and who do not endorse the behavioral finance view, end up failing to learn, thus suggesting that many behavioral finance patterns are rooted in human behavior and difficult to be overcome by learning
Chang (2008)	Evidence of the disposition effect in investors of the Taiwanese warrant markets
Kliger and Kudryavtsev (2008)	The reference point updating process of the disposition effect is more reactive to events when information flow is low and prices are sensitive to market fluctuations. Agents facing numerous alternatives consider those that have caught their attention
Lee et al. (2008)	Evidence of the disposition effect in internet-based stock trading
Goetzmann and Massa (2008)	A panel of individual investor trading records shows that exposure to a portfolio of stocks held by disposition-prone investors explains cross-sectional differences in daily returns
Hales (2007)	Investors are motivated to agree unthinkingly with information that suggests they might make money on their investment, but disagree with information that suggests they might lose money
Hedesstrom et al. (2007)	In an internet-based survey of fictitious choices among fund categories, home bias and a diversification heuristic were unaffected by previous stock market investment experience
Garvey and Murphy (2004)	Data on a US proprietary stock-trading team provide evidence of the disposition effect

tual field experiment; (3) framed field experiment; and (4) natural field experiment. As observed, ours is a framed field experiment, which is also an artefactual field experiment but with field context in the task and information set used by the subjects.

Table 1 presents the main results of selected recent work related to the disposition effect and investor experience; the reader may wish to consider the references therein for a more comprehensive account of the vast literature on the subject.

The rest of this paper is organized as follows. Section 2 presents the three measures of the disposition effect employed in this work, Section 3 details the design of the experiment, Section 4 presents the characteristics of the subjects participating in the experiment, Section 5 reports results, and Section 6 concludes the study. A sensitivity analysis of the results is presented in an Appendix.

2. Measures of the disposition effect

Experimental studies typically track the disposition effect whenever subjects sell more (less) stocks as the sale price is above (below) either the purchasing price or the previous price (Weber and Camerer, 1998). However, such a measure can be misguiding in the presence of bull–bear market cycles. For instance, in a bull market a stock sold is more likely to be a winner. Here investors might rationally think that rising prices will tend to persist in future, thereby making sense to sell winners (Da Costa et al., 2008). Since our experiment is run in an artificial market we consider the measure of the disposition effect commonly used in real-world markets (Odean, 1998) that is able to take market cycles into account. However, Odean's measure is not without problems, as discussed below. For that reason, we also assess the disposition effect in our experiment by two other measures: that of Weber and Camerer (1998), and a more recent one suggested by Dhar and Zhu (2006).

Odean's measure considers the actual and potential trades of investor i during a sample period. Potential trades refer to stocks in a portfolio that were not sold but that could have been either winners or losers. The proportion of gains realized (PGR_i) and proportion of losses realized (PLR_i) are computed as

$$PGR_i = \frac{N^i_{gr}}{N^i_{gr} + N^i_{gp}}, \quad PLR_i = \frac{N^i_{lr}}{N^i_{lr} + N^i_{lp}} \tag{1}$$

where N^i_{gr} (N^i_{lr}) is the number of trades by investor i with a realized gain (loss), and N^i_{gp} (N^i_{lp}) is the number of potential trades for investor i with a gain (loss).

The disposition effect (DE) of investor i is then

$$DE_i = PGR_i - PLR_i \tag{2}$$

where $-1 \leqslant DE_i \leqslant 1$. A positive value of DE_i indicates that a smaller proportion of losers is sold if compared with the proportion of winners sold, in which case investor i exhibits the disposition effect.

The definition in Eq. (2) can be evaluated by the t-statistic

$$t = \frac{PGR_i - PLR_i}{SE_i} \tag{3}$$

where the standard error SE_i is

$$SE_i = \sqrt{\frac{PGR_i(1 - PGR_i)}{N^i_{gr} + N^i_{gp}} + \frac{PLR_i(1 - PLR_i)}{N^i_{lr} + N^i_{lp}}}. \tag{4}$$

One disadvantage of Eq. (2) is that the PGR_i and PLR_i measures are sensitive to portfolio size and trading frequency (Odean, 1998). They are likely to be smaller for investors who hold larger portfolios and trade frequently because those portfolios contain a larger number of stocks with capital gains and capital losses. This problem gets more serious as the measures are employed in cross-sectional analyses.

Thus we also employ two other measures of the disposition effect that are not sensitive to portfolio size and trading frequency. The first one is precisely the measure of Weber and Camerer (1998), which considers the difference between the number of trades with realized gains by investor i and the number of trades with realized losses relative to the number of all trades, that is,

$$DE_i = \frac{N^i_{gr} - N^i_{lr}}{N^i_{gr} + N^i_{lr}} \tag{5}$$

where $-1 \leqslant DE_i \leqslant 1$. If the number of trades with realized gains matches the number of trades with realized losses there is no disposition effect. The other measure is that of Dhar and Zhu (2006):

$$DE_i = \frac{N^i_{gr}}{N^i_{lr}} - \frac{N^i_{gp}}{N^i_{lp}} \tag{6}$$

3. Experiment design

To run our experiment we employ the computer program that simulates the stock market called SimulaBolsa®, which was developed by one of us (J.M.). Fig. 1 shows the program's main menu. The program generates an individual report for all the decisions made by the subjects throughout the simulation period. The output can thus allow one to get informed about variables, such as the number of stocks bought and sold each period, and individual portfolio composition at the end of a period.

The program was fed with actual data for stock prices taken from the Sao Paulo stock exchange (Bovespa) for the 5-year period from January 1997 to December 2001. The program also included