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# The role of regret and disappointment in the repurchase effect: Does gender matter?

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ABSTRACT

This paper analyzes gender differences in the repurchase effect in an experiment based on Frydman and Camerer (2016). The results show that women exhibit a significantly higher repurchase effect than men. Specifically, women are more reluctant than men to repurchase a stock that increases in price following a prior sale. However, no significant gender difference in the repurchase of a sold stock that decreases in price is found. Furthermore, women are more strongly impacted than men by regret and disappointment from repurchasing a sold stock that increases in price, but no such impact exists from repurchasing a sold stock that decreases in price.

## 1. Introduction

Emotions, such as regret and disappointment, are important factors in an investor's decision regarding purchasing and repurchasing stocks (see Duxbury, 2015 for a review). Prior studies examine how regret and disappointment impact the "repurchase effect", defined as an investor's tendency to repurchase a stock that decreases in price and not to repurchase a stock that increases in price subsequent to a prior sale of the stock (Strahilevitz et al., 2011; Frydman and Camerer, 2016).[1] Strahilevitz et al. (2011) suggest that an investor feels regret and is disappointed after selling a stock if the stock continues to rise and that such regret and disappointment deter the investor from repurchasing the sold stock. Magron and Merli (2015) also suggest that regret is an important factor in explaining an individual investor's repurchase behavior. They test some alternative explanations for the repurchase effect but do not find any significant effects of standard motivations on the repurchase effect.[2]

In one of the first studies of the repurchase effect in the laboratory, Weber and Welfens (2011) find that subjects are less likely to repurchase a stock that increases in price when the decision to sell was voluntary than they are when the decision was mandatory. Frydman and Camerer (2016), in the first study from a neuroscientific perspective, show that a regret signal is encoded when an investor observes an increase in the price of a previously sold stock and that the repurchase effect is correlated with the size of the regret signal.

The above literature suggests that regret and disappointment affect the repurchase effect. However, less known is how regret and disappointment impact the repurchase of stocks between genders. In this paper, we conduct an experiment to examine gender differences in the repurchase effect and how regret and disappointment affect the repurchase effect differently for women and men.

Psychological research demonstrates that there are significant gender differences in the experience of emotions (Fujita et al., 1991; Hall, 1978). Gard and Kring (2007) find that women and men respond differently to negative events but not to positive events and that women are more affected by negative events. Therefore, we hypothesize that women perceive more regret and disappointment than men when the price of a sold stock increases and that there are no gender differences in regret and disappointment when the price of a sold stock decreases. In addition, because of such regret and disappointment, women are more reluctant than men to repurchase a stock that rises in price.

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[1] In this paper, we do not examine another type of repurchase effect that is reported in the literature in which investors have the tendency to repurchase a stock previously sold at a gain and are reluctant to repurchase a stock previously sold at a loss (Strahilevitz et al., 2011).

[2] Standard motivations may include public or private information-based trading, tax motivations, and contrarian strategies.

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To test our hypotheses, we conduct an experiment that is similar to that conducted by Frydman and Camerer (2016). We measure regret and disappointment based on a subject's response to a questionnaire in the context of stock trading, following Lin et al. (2016).[3] Summers and Duxbury (2012) also adopt this approach in their study of the effects of regret and disappointment on the disposition effect (Shefrin and Statman, 1985).

We find strong support for our hypotheses. Women are found to report higher levels of regret and disappointment than men when the price of a stock increases subsequent to a prior sale. However, no significant gender differences in regret and disappointment are found for a sold stock that decreases in price. Women are more reluctant than men to repurchase a stock that increases in price because of the effects of regret and disappointment. In contrast, no gender difference is found in the repurchase effect of the stock that decreases in price.

Our paper is related to the literature that investigates gender differences in financial decision making. Prior studies suggest that women dislike participating in the stock market (Bannier and Neuberty, 2016) and that they tend to invest in less risky assets (Jianakoplos et al., 1998).[4] Women also appear to be less overconfident in trading stocks (Barber and Odean, 2001) and trade less frequently (Fellner and Maciejovsky, 2007). However, female investors' participation in the stock market seems beneficial to the stability of stock prices because a female-only market has lower price bubbles than a male-only market (Eckel and Füllbrunn, 2015). A mixed-gender composition can also reduce mispricing in asset markets (Cueva and Rustichini, 2015).

Unlike the above literature, we investigate gender differences in the repurchase of stocks previously sold. Nofsinger and Varma (2013) argue that investors gain more profit from moving to profitable stocks instead of repurchasing stocks that they purchased in the past. However, investors tend to buy stocks that draw their attention (Barber and Odean, 2008), such as familiar stocks (Huberman, 2001). Because major national and international stock indices are composed of only a small number of stocks, such as blue chips, investors who buy these stocks are naturally engaged with repurchasing the stocks. Investigating gender differences in repurchase behavior is important, as it may help better understand trading behaviors (Weber and Welfens, 2011).

Our study complements the emerging literature that examines how investor characteristics affect decision biases in trading behaviors, such as the disposition effect and the repurchase effect. Feng and Seasholes (2005) suggest that the disposition effect is correlated with an investor's gender, age, and trading experience. Dhar and Zhu (2006) find that income and occupational status also influence the magnitude of the disposition effect. Magron and Merli (2015) reveal that investors who have more stock trading experience are less prone to the repurchase effect. Our study contributes to the literature by showing that women exhibit a higher repurchase effect than men.

The paper proceeds as follows. Section 2 describes the details of the experiment. Section 3 presents the results. In Section 4, we examine if the gender differences in the repurchase effect emerge in a treatment without emotion elicitation. We then draw conclusions in Section 5.

[3] To eliminate the effect of emotion elicitation, we recruited 36 subjects in a subsequent study to participate in a treatment without emotion elicitation. See Section 4.

[4] This phenomenon may be explained by women's less sophisticated financial knowledge (Lusardi and Mitchell, 2008), greater risk aversion (Croson and Gneezy, 2009; Charness and Gneezy, 2012), and avoidance of engaging in aggressive competition with male traders (Gneezy et al., 2003; Niederle and Vesterlund, 2007).

## 2. Experiment design

### 2.1. Basic design

The design of the asset market in the experiment is adapted from Frydman and Camerer (2016). A subject is endowed with 50 Experimental Currency Units (ECU) and three stocks labeled as A, B, and C. The initial price of each stock is 100 ECU. The experiment consists of 45 periods.[5] In each period, one of the three stocks is randomly chosen by a computer. The price of the chosen stock is updated, while the two unchosen stocks remain unchanged. Each stock receives a price update only when it is chosen in a period. In periods 1 to 9, a subject is not allowed to repurchase or sell any stock but observes price updates of one of the three stocks. In period 10, the subject can sell a stock for the first time. In the following periods 11 to 45, the subject may repurchase or sell stocks.

Each subject is allowed to hold a maximum of only one unit of each stock and cannot hold any negative units, which means that short selling is not allowed. Therefore, the trading decision in a period is reduced to whether to sell a stock (conditional on holding it) or repurchase it (conditional on not holding it). A subject can carry a negative cash balance to repurchase a stock even without sufficient cash. The amount of the negative cash balance is subtracted from the subject's total payoff at the end of the experiment.

In each period, a subject first observes a stock price update on computer screen and then reports disappointment about the prior stock trading outcome and regret about the prior stock trading decision, both of which are measured on a 7-point Likert scale with endpoints labeled Strongly Disagree (1) and Strongly Agree (7). Specifically, a subject is asked to rate two statements, i.e., "I feel disappointed with the outcome" and "I feel regretful for having purchased the stock" if they hold the stock or "I feel regretful for having sold the stock" if they do not hold the stock. After responding to these two statements, the subject decides whether to repurchase or sell the stock. The price at which a subject repurchases or sells the stock is determined by the current price in a period.

The price change in each stock is controlled by a hidden two-state Markov chain that includes a good state and a bad state. The Markov chains of the three stocks are independent of one another. Before period 1, the three stocks are randomly assigned to either a good state or a bad state. States are then updated only after a stock is chosen and receives a price update in the period. Specifically, assume stock $i$ is in a good state in period $t$. If stock $i$ does not receive the price update in period $t + 1$, the state and price of stock $i$ remain unchanged. If stock $i$ does receive the price update, the state of stock $i$ in period $t + 1$ remains good with a probability of 0.8 and switches to bad with a probability of 0.2. In the good state, the price of the stock increases with a probability of 0.6 and decreases with a probability of 0.4. In the bad state, the price of the stock decreases with a probability of 0.6 and increases with a probability of 0.4. The magnitude of the price update is drawn uniformly from {5 ECU, 10 ECU, 15 ECU} and is independent of the direction of the price change. The states of a stock are always hidden from the subject, but the subject can make Bayesian inferences about states by observing price changes.

To control the effect of the stock price on trading behavior, we vary the sequence of realized prices of stock A. There are two paths of realized stock prices, Price Path 1 (stock A1, stock B and stock C) and Price Path 2 (stock A2, stock B and stock C). The price of each stock is updated 15 times (See Fig. 1 for more details). There are five sessions in each price path. A total of 52 subjects (22 men) participated in the experimental sessions of Price Path 1, and 54 subjects (31 men) participated in the sessions of Price Path 2. Subjects' repurchase behaviors

[5] In order to control the end effect, this information is not given to the subject.