

Peer Pressure: Does Social Interaction Explain the Disposition Effect?

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March 2014

Abstract

This paper provides evidence that social interaction contributes to the disposition effect. I analyze a unique database drawn from a social network for retail traders. Participating in the social network requires an agreement between the social network and a trader's brokerage. The introduction of roughly fifty retail-specific brokerages into the social networking environment was staggered over time, which provides an opportunity to causally identify the impact of social interaction. Traders are almost twice as susceptible to the disposition effect after entering the social network. Relative to the formation of a simulated network, traders who are similarly prone to the disposition effect tend to form friendships with one another, which suggests a feedback effect. A number of alternative theories – adverse selection, transaction costs, blame delegation, learning, and a belief in mean-reversion – while valid on their own, are unlikely to explain the detrimental impact of social influence. The social network increases (has little effect on) the propensity to hold onto losses (gains), which supports the simplest explanation for the disposition effect: individuals are loss-averse, and it can be even more painful to admit defeat in the presence of others.

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The disposition effect – the tendency to sell winning assets while holding onto losers – is one of the most robust deviations from what financial economists consider to be rational trading behavior. A sample of individual investors on a discount brokerage in the U.S. (Odean (1998)) and the population of Finnish (Grinblatt and Keloharju (2001)) and Taiwanese stockholders (Barber et al. (2007)) all exhibit the disposition effect. Professional investors are also more likely to hold onto losers (Coval and Shumway (2005) and Locke and Mann (2005)). The disposition effect even exists in controlled laboratory experiments (Weber and Camerer (1998)). Mutual fund holders prove to be a notable exception (Calvet, Campbell, and Sodini (2009)).¹

The pervasiveness of the disposition effect across many assets classes and investor types has prompted a number of proposed explanations. Preferences for realizing gains over losses can produce trading behavior indicative of the disposition effect (Barberis and Xiong (2012)). It should generate a discontinuity in trading around zero, which is not found in data on common stock trading in a discount brokerage (Ben-David and Hirshleifer (2012)). The disposition effect may arise because of adverse selection and the mechanical execution of limit orders (Linnainmaa (2010)). Trader experience and sophistication lessens the disposition effect (Feng and Seasholes (2005)), which suggests the disposition effect may be related to rational learning by trading. The delegation of blame is one such explanation, which helps reconcile the apparent contradiction of findings among mutual fund holders (Chang, Solomon, and Westerfield (2013)).

While most standard theory considers the average behavior of a trader acting in isolation, it may be challenging to draw inference from observational data without acknowledging the context in which trading takes place. With respect to the disposition effect, one of the more pleasing explanations is that individuals experience discomfort when forced to admit defeat.

¹Kuastia (2010) provides an excellent overview of the literature.

While it can be difficult to admit one's own failures, it may be even more painful to make such an admission in front of others. Shefrin and Statman (1985) suggest as much:

“...The Traders who get wiped out hope against hope... They're stubborn. They refuse to take losses... When you're breaking in a new trader, the hardest thing to learn is to admit that you're wrong. It's a hard pill to swallow. You have to be man enough to admit to your *peers* that you're wrong and get out. Then you're alive and playing the game the next day.” (Shefrin and Statman (1985, pg. 783))

This paper suggests that the social component of trading can produce new and stronger tests of this classic explanation for the disposition effect. In particular, I analyze the impact of a new social network for individual investors in the market for foreign exchange. The social network, myForexBook, allows traders to form bilateral friendships and share the content of one's portfolio in real-time, and without the possibility of “cheap-talk”.

To participate in the social network, a trader's brokerage has to reach a data-sharing agreement with myForexBook. The introduction of this new technology can be thought of as an exogenous shock to the channels of communication between traders, and the staggered introduction of roughly 50 different retail brokerages across time accounts for contemporaneous factors that may drive sociability and trading behavior. Thus, the empirical strategy is essentially a difference-in-differences style analysis that compares an individual's susceptibility to the disposition effect before and after entering the network, with the incorporation of a new brokerage behaving similar to an instrumental variable that satisfies the necessary exclusionary restrictions.

There are several advantages to studying the disposition effect within the market for retail foreign exchange. First, there are a limited number of assets available. Roughly a third of all trading volume takes place on the EUR/USD, while the other major currency pairs constitute the rest. This feature of the market helps avoid any alternative explanations

related to selection across securities based on their characteristics (Kumar (2009)). Secondly, transaction costs are minimal in foreign exchange. Instead of charging fees per transaction, retail brokerages act as market makers, earning the spread, which tends to average just a few pips. Third, the data includes both market and limit orders, which allows this research to directly address the possibility that the social network has an effect on adverse selection (Linnainmaa (2010)). Fourthly, the forex market is large and highly liquid, which means it is unlikely that the cumulative activity of the social network is large enough to exert an influence over prices. Thus, the trading environment in this paper is much closer to an experimental setting than comparable studies of stock market participants, and is arguably better suited to studying the disposition effect outside of a laboratory.

Empirical tests reveal that traders are more susceptible to the disposition effect following the introduction of the social network. Prior to joining the network, traders are about two to three percentage points more likely to sell gains than losses at any given point in time, which is in line with comparable studies in equities (Chang, Solomon, and Westerfield (2013)) and a sample of retail forex traders who never participate in the social network. Entrance into the social network nearly doubles the disposition effect, a finding which is strongly robust to a number of alternative considerations, including the use of limit orders, trading style, experience, leverage, and time fixed effects. The influence of the social network is most pronounced in the loss region, which suggests that social interaction amplifies loss-aversion. This is consistent with recent evidence that psychological processes differ with respect to gains and losses (Kuhnen (2013)).

Supporting evidence in favor of the social network's influence is provided by using a simulated network to examine the matching process between traders. In particular, I generate a randomly-drawn network that preserves the distribution of the disposition effect across traders. In comparison to the randomly drawn network, traders in the myForexbook data are substantially more likely to associate with traders who are similarly susceptible to the

disposition effect. This suggests a feedback effect between traders that reinforces bad trading behavior. Moreover, high disposition effect traders are less likely to send messages to other traders, implying a reluctance to draw attention to one’s failings once realized.

Several alternative explanations appear unlikely. First, the social network offers an opportunity for traders to become better informed about the distribution of outcomes, which suggests a learning or information aspect of the disposition effect. Contrary to this hypothesis, traders become more susceptible to the disposition effect following entrance into the network, and the effect is particularly pronounced among less experienced traders with the most to learn about trading. Secondly, the social network may contribute to adverse selection, but instead it presumably grants traders access to better information on order-flow, which would produce the opposite prediction. Moreover, the regression analysis accounts for limit-orders, which tend to be more prone to adverse selection. Third, blame delegation would suggest an increased tendency to realize losses, as traders could attribute their bad trades to the strategies of others in the network. Lastly, I use each trader’s preferred trading strategy (as indicated by a survey), to rule out the possibility that the social network relates to the belief in mean-reversion.

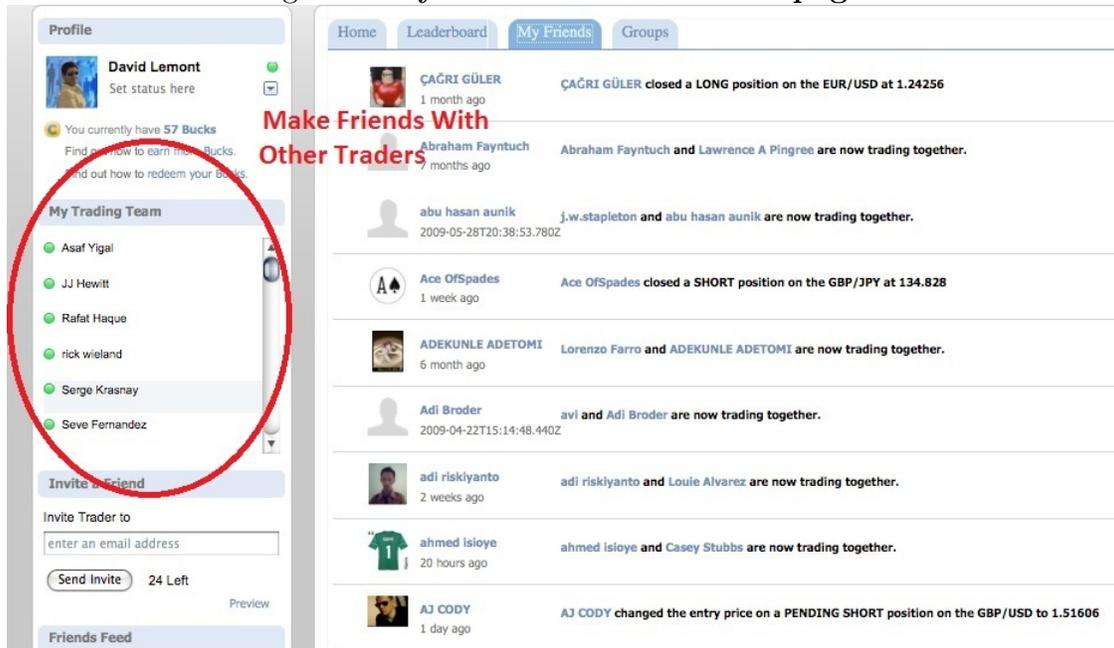
This paper is organized as follows. Section 1 describes the proprietary social network data. Section 2 outlines the identification strategy for the empirical tests in Section 2. Further suggestive evidence in favor of the social network’s influence is presented in Section 4. Section 5 outlines some alternative explanations. Concluding thoughts are offered in Section 6.

1 Data: A Social Network for Traders

The data used in the following empirical analysis was compiled by a social networking website that, for privacy purposes, I call myForexBook. Registering with myForexBook – which is

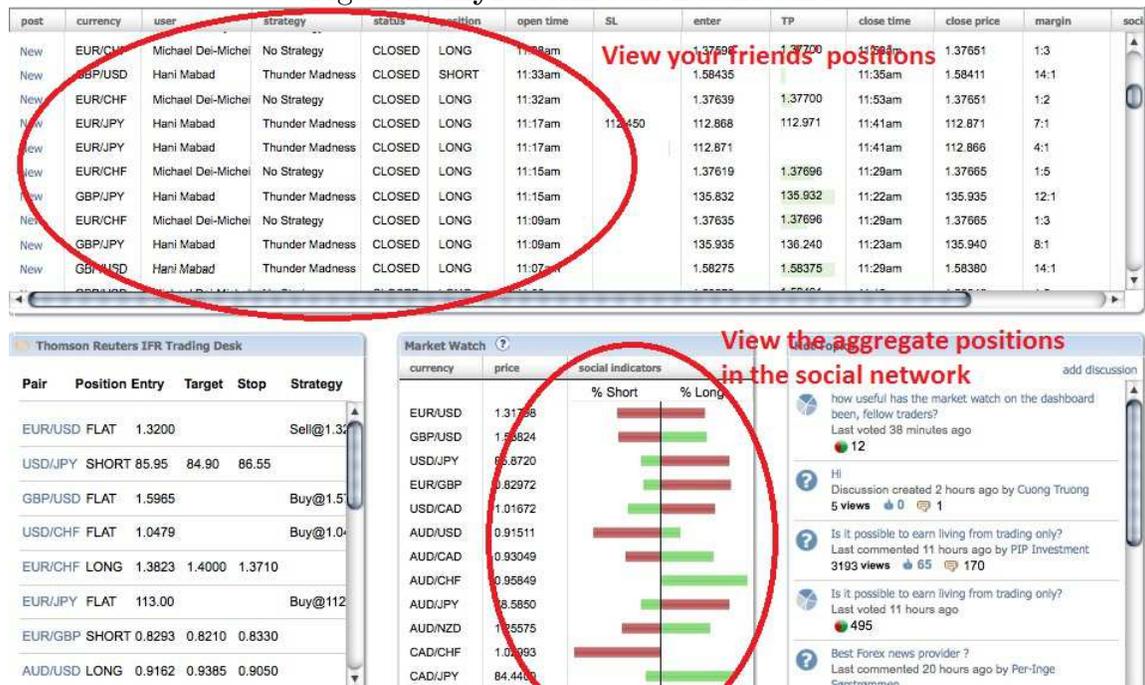
free – requires a trader to have an open account with one of roughly 45 retail specific forex brokers. Once registered, myForexBook can access a trader’s complete trading record at those brokers, even the trades they made before joining the network. New trades are entered via the retail brokerages but they are simultaneously recorded in the myForexBook database and are time-stamped to the second. Hence, there are no concerns about reporting bias. An example of a myForexBook user’s homepage is displayed in Figure 1 and some of the network’s features are illustrated in Figure 2.

Figure 1: myForexBook User Homepage



Description: This figure displays the user homepage for a member of myForexBook. Users are able to form bi-lateral friendships with other traders and communicate via private message or in the chat forum.

Figure 2: myForexBook Dashboard



Description: This figure displays a customizable webpage dashboard available to members of myForexBook. Users are able to view their friends' positions in real-time, the aggregate positions within the network, and chat in web-forums, among other options.

There are 5,693 traders in the database who made roughly 2.2 million trades which mostly occurred between early-2009 and December, 2010. Heimer and Simon (2013) presents a more detailed discussion of the social networking aspects of the database and the trader's performance. To briefly summarize, the median trader in the untrimmed dataset is 36 years old, from the USA or Western Europe, has one to three years of experience, considers themselves to be a technical trader, and loses money. The typical trader sends about five messages per week and has around fifteen to twenty friends.

The social network was intended to provide traders with greater access to order flow information and the ability to share strategies between traders. Instead, the social network appears to have exacerbated the bad behavior of many traders. Heimer and Simon (2013)

shows that the self-enhancing tendency of traders causes them to broadcast victories while remaining mute following investment failures. This pattern of communication instigates traders to increase their portfolio turnover without actually increasing their performance. Likewise, traders with more friends tend to exhibit overconfident trading behavior (Heimer (2013)). The use of leverage leads to underperformance especially when traders are overconfident.

The data compares favorably to other studies of retail traders. Similar to traders of common stock on a discount brokerage (Barber and Odean (2000)), retail foreign exchange traders tend to lose on average, and more trading does not necessarily result in increased profitability. As illustrated in the following section, retail foreign exchange traders are roughly as prone to the disposition effect as traders in the Barber and Odean sample (Chang, Solomon, and Westerfield (2013)). Moreover, the traders in this study appears to be representative of the typical retail foreign exchange trader in the U.S. Well over half of the traders in the myForexBook database are unprofitable and a similar number lose in the overall population of retail foreign exchange traders, across the population of brokerages, according to quarterly reports compiled by the CFTC.

The sample used in this research is restricted to include only traders for whom there is data before and after joining the social network, and to those who made at least fifty round-trip trades. The trimmed data includes 2,598 traders who made 965,995 total trades, 59 percent of which occurred after joining the social network.

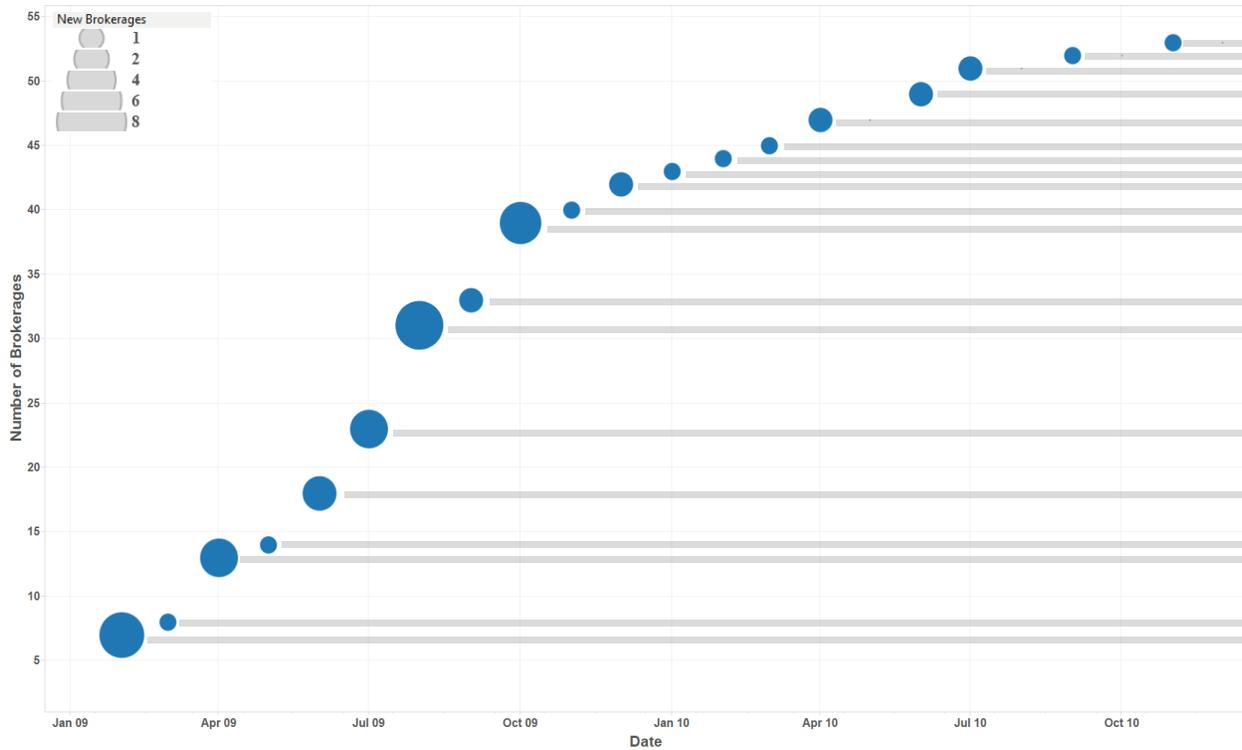
The trimmed sample does not appear to be much different from the rest of the data. There are a few hundred traders for whom there is only data before joining the social network. These traders compare favorably to the trimmed sample prior to joining the network. In unreported analysis, I separately perform the main disposition effect linear regression using the trimmed sample, pre-myForexBook, and using the sample of traders with traders who never participate in the social network. A Chow test for the null-hypothesis that the

disposition effect coefficient is equal across regressions produces a p-value of 0.25, which suggests the two groups are similar. Anecdotal evidence also supports the notion that the trimmed sample is a randomly drawn slice of the myForexBook dataset. The operators of the social network had to manually extract the pre-myForexBook data. They had not yet completed this task by the time I acquired the dataset, and to the best of my knowledge, the order of extraction was not in any way correlated with investor characteristics or trading behavior.

2 Identification Strategy

The creation of a social network for retail traders, myForexBook, can be thought of as a technological innovation which eases the channels of communication between traders, thereby exogenously increasing investor sociability. The data includes trading records from both before and after joining myForexBook, but the process by which traders were granted access to the network was staggered over time at what appears to be a random rate. To gain access to the social network, a trader's brokerage had to form a partnership with the operators of myForexBook. The process requires a mapping from the brokerage's server to myForexBook's in order for myForexBook to access individual trading records. Thus, unless the introduction of a new brokerage is in some way correlated with the relationship between trader sociability and the disposition effect, it appears to be a clean instrument.

Figure 3: myForexBook and Partnerships With New Brokerages



Description: This figure illustrates the incorporation of new brokerages into the myForexBook social network. Each dot represents the introduction of new traders from a different brokerage into the network. The size of the dot corresponds to the number of new brokerages to form a partnership in a given month.

Figure 3 shows that the process by which new brokerages were introduced into the social networking environment occurred gradually over time. To illustrate the identification strategy, consider the six different brokerages to partner with myForexBook in February of 2009. Traders on those brokerages are able to join the social network and communicate with one another. On the other hand, roughly four brokerages also partnered with myForexBook later that year in July. Traders on those four new brokerages may have wished to join the

network, but were unable to do so until their brokerage reached a data-sharing agreement. Thus, it is possible to compare a cohort of traders participating within the social network with a comparable one constrained from doing so. This friction is similar to Shue (2013), which uses class reunions among Harvard MBA cohorts to identify the causal impact of peer-influence.

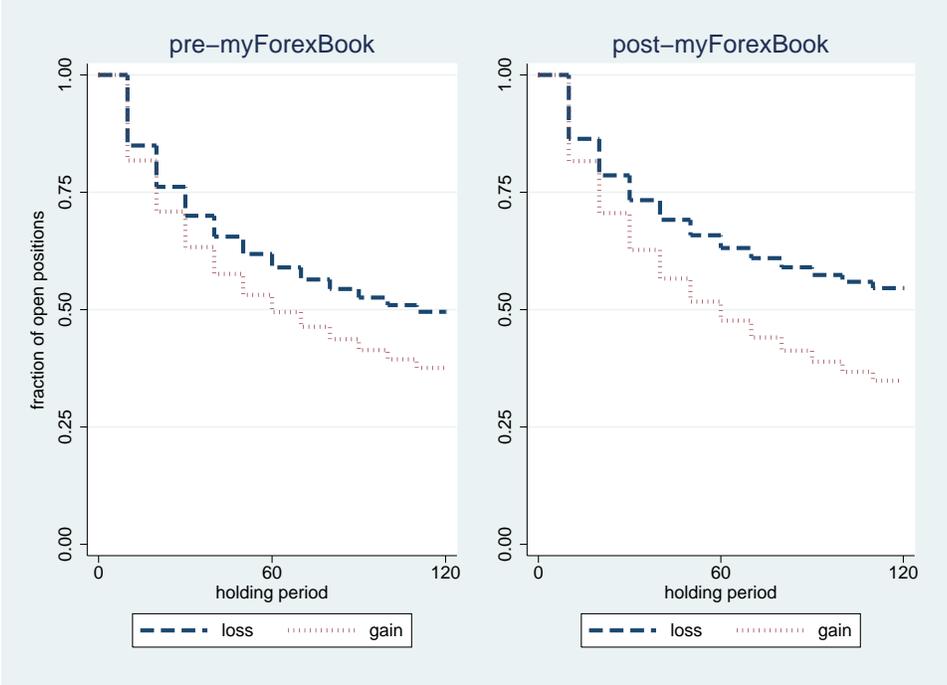
There are clearly concerns about selection into the network and how the selection propensity correlates with trading biases. However, broadly speaking, retail traders appear susceptible to social influence. Social individuals are more likely to participate in asset markets (Hong, Kubik, and Stein (2004), Brown et al. (2008), and Li (2014)). Social households are also more likely to portfolio churn (Heimer (2013)) and the decision to purchase any given security tends to be a function of the fraction of neighbors to have recently purchased it (Shive (2010) uses the population of traders in Finland, while Heimer and Simon (2013) uses the myForexBook data). Moreover, within studies of equities, the population of traders using online media appears to have sufficient market power to influence asset prices (Frank and Antweiler (2004) and Chen et al. (2014)). Therefore, with respect to the typical non-institutional trader, it seems reasonable to suggest that the use of online media to aid trading activity is the norm rather than the exception.

3 The Disposition Effect and Social Interaction

Graphical evidence suggests that social interaction contributes to the disposition effect. Figure 4 plots estimates of a Kaplan-Meier survival function in which the outcome of interest is an indicator variable for closing a position. The survival function is plotted separately for paper gains and paper losses. It provides evidence of a disposition effect if the cumulative sale of paper gains is greater than the corresponding sale of losses.

Among the traders in this study, a greater percentage of losses than gains go unsold at any given point in time, a gap which widens as the holding period on the trade increases (left panel). The difference between the paper gain and paper loss survival function widens when the data is restricted to trades issued following entrance into myForexBook (right panel), which suggests that social interaction increases the disposition effect. The effect of the social network is most pronounced in the loss region. The paper loss survival function is noticeably flatter following entrance into the social network.

Figure 4: **Holding Period of Gains/Losses and Social Interaction**



Description: This figure plots estimates of a Kaplan-Meier survival function in which the outcome of interest is an indicator variable for a closing a position. Both graphs separate the survival function by paper gains and paper losses. The graph on the left is estimated using data from prior to joining myForexBook, while the graph on the right uses post-myForexBook data. The data is restricted to just market orders.

Regression analysis provides tests of the disposition effect while controlling for a number of contemporaneous factors which may drive the difference between pre- and post-

myForexBook trading patterns. Similar to Chang, Solomon, and Westerfield (2013), the disposition effect is estimated via the following specification:

$$sale_{ijt} = \beta_0 + \beta_1 \cdot gain_{ijt} + \varepsilon_{ijt}, \quad (1)$$

where $sale_{ijt}$ equals one if the currency pair, i , is sold by trader, j , at a given point in time, t , zero otherwise. The independent variable, $gain_{ijt}$, is equal to one if the sale price is above the price trader i purchased the currency pair. The unconditional probability of selling the currency pair is captured by the intercept, β_0 . A positive coefficient on $gain_{ijt}$, β_1 , implies that traders are more likely to sell positions at a gain than at a loss, which suggests a disposition effect. All regressions include an interaction with an indicator variable equal to one if the trade was executed using a stop-loss or take-profit. These price-contingent orders execute automatically and should be treated different as a result, but not excluded from the regression analysis since they are used endogenously by the trader. Accounting for price-contingent orders is an improvement over many existing studies. The equation is estimated using OLS in order to aid in the reader's interpretation of coefficient magnitudes, but is robust to using a logistic model with maximum likelihood as in Grinblatt and Keloharju (2001). Standard errors are double-clustered at the level of the trader and week.

The following regression specification tests the effect of social interaction on the disposition effect:

$$sale_{ijt} = \beta_0 + \beta_1 \cdot gain_{ijt} + \beta_2 \cdot postFB_{ijt} + \beta_3 \cdot gain_{ijt} \cdot postFB_{ijt} + \varepsilon_{ijt}, \quad (2)$$

The regressor, $postFB_{ijt}$, is an indicator variable equal to one for trades issued after trader j has joined myForexBook, zero otherwise. The coefficient on the interaction term between $gain_{ijt}$ and $postFB_{ijt}$ measures the extent by which the disposition effect changes as a

function of social interaction. As illustrated in Section 1, the staggered incorporation of new brokerages into the myForexBook environment counters the argument for time-invariant effects and suggests a causal interpretation of β_3 .

Table 1: **The Effect of Social Interaction on the Disposition Effect**

Description: This table plots the results from estimating the following regression: $sale_{ijt} = \beta_0 + \beta_1 \cdot gain_{ijt} + \beta_2 \cdot postFB_{ijt} + \beta_3 \cdot gain_{ijt} \cdot postFB_{ijt} + \varepsilon_{ijt}$, in which $sale_{ijt}$ is an indicator variable for closing a position, $gain_{ijt}$ is an indicator for a paper gain, and $postFB_{ijt}$ is an indicator if the position was opened after trader j joined myForexBook. Standard errors are double-clustered by trader and week.

	pre-social network	post-social network	full sample			
$sale_{ijt}$	(1)	(2)	(3)	(4)	(5)	(6)
$gain_{ijt}$	0.0213*** (0.0020)	0.0367*** (0.0084)	0.0213*** (0.0020)	0.0223*** (0.0017)	0.0221*** (0.0017)	0.0213*** (0.0020)
$postFB_{ijt}$			-0.00938 (0.0058)	-0.00695* (0.0039)	-0.00683* (0.0039)	-0.00602 (0.0058)
$gain_{ijt} \times postFB_{ijt}$			0.0154** (0.0077)	0.0143** (0.0071)	0.0146** (0.0072)	0.0158** (0.071)
$limit\ order_{ijt}$	-0.0174*** (0.0036)	-0.00406 (0.0070)	-0.0174*** (0.0036)	-0.0146*** (0.0030)	-0.0145*** (0.0031)	-0.0185*** (0.0035)
$gain_{ijt} \times limit\ order_{ijt}$	0.00652** (0.0026)	-0.0119 (0.0085)	0.00652** (0.0026)	0.00380* (0.0023)	0.00402* (0.0023)	0.00666*** (0.0025)
$constant$	0.0665*** (0.0033)	0.0571*** (0.0067)	0.0665*** (0.0033)	0.122*** (0.014)	0.121*** (0.014)	0.146 (0.098)
week FE	No	No	No	No	No	Yes
$holding\ period_{ijt}$	Yes	Yes	Yes	Yes	Yes	Yes
experience FE	No	No	No	Yes	Yes	No
approach FE	No	No	No	Yes	Yes	No
$leverage_{ijt}$	No	No	No	No	Yes	No
N	3,033,189	4,429,894	7,463,083	7,463,083	7,390,840	7,463,083
adj. R^2	0.0033	0.0037	0.0036	0.025	0.025	0.0047

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1 presents the results from estimating the disposition effect regressions. Column (1) estimates Equation 1 using the sample of trades made prior to joining myForexBook, while column (2) estimates the same equation using the sample from after joining. The coefficient on $gain_{ijt}$ in column (1) is equal to 0.021 (s.e. = 0.002), which suggests traders are about two percent more likely to sell positions at a gain. This implies a disposition

effect that is similar in magnitude to other studies of common-stock holders (if not slightly smaller) (Chang, Solomon, and Westerfield (2013)). In column (2), the coefficient is 0.037 and statistically significant at the one percent error level. The coefficient using the post-entry data is nearly double the size of that which uses the pre-entry sample, which provides some initial evidence that the disposition effect is strongest within the context of a social setting.

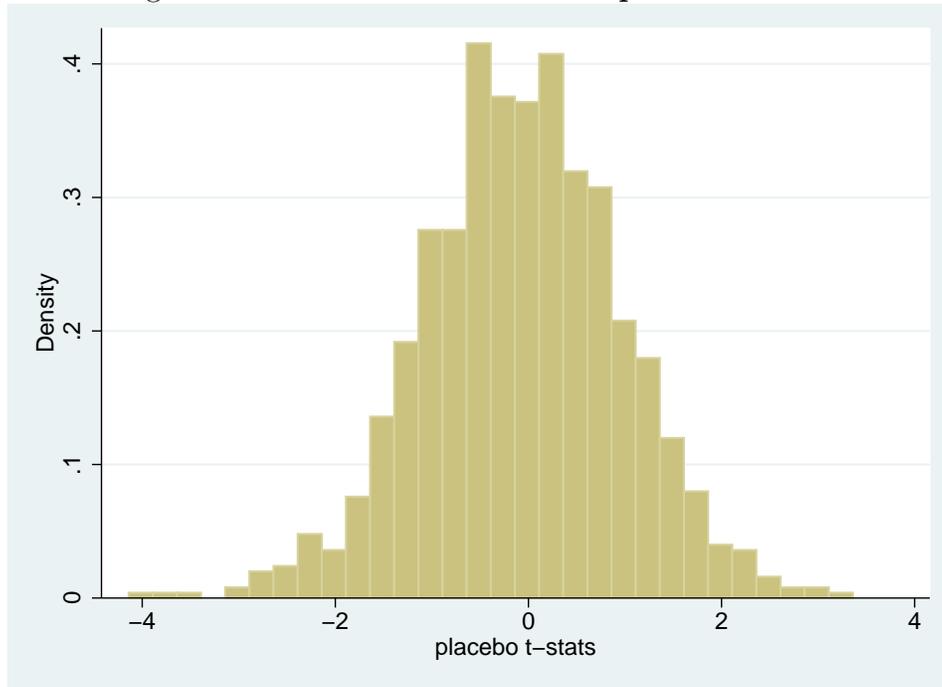
Column (III) presents estimates of Equation 2, which interacts an indicator variable for trades made after joining the network with an indicator variable for gains. The coefficient estimate is around 0.015 (s.e. = 0.003), implying that introducing a trader into a social setting increases trader susceptibility to the disposition effect by close to twice as much. Column (IV) employs a similar regression, but also controls for trader experience and self-identified trading style. Column (V) includes the amount of leverage used on the trade as an independent variable. Trades that use more leverage may reflect a greater degree of confidence in one's beliefs about the value of an asset and therefore may correlate with the propensity to hold onto losers. The regression presented in column (VI) contains weekly fixed effects on the right-hand side to account for common, time-invariant shocks that may confound the relationship between social interaction and the disposition effect. In all cases, the coefficient on the interaction term, β_3 , is quantitatively similar to 0.015 and statistically significant at the five percent error level.

Placebo Exercise

I conduct a placebo exercise to see how likely it is to produce false positive results favoring the social network's influence. In particular, I take the sample of traders who never use the social network and randomly assign a one to 59 percent of the total trades, zero otherwise. While doing so, I preserve the order of trading such that within a given trader's history, all of the ones are placed after the zeros. This variable acts as a false version of $postCS_{ijt}$. I

conduct this randomization a thousand times, each time estimating Equation 2 and collecting the coefficient and standard errors.

Figure 5: **Placebo Test of the Disposition Effect**



Description: This figure presents estimates of the t-statistic on the interaction term between $gain_{ijt}$ and $postFB_{ijt}$, while using false dates for $postFB_{ijt}$. The falsification exercise uses the sample of traders who never use the social network.

Figure 5 presents the distribution of t-statistics from the falsification exercise. The distribution follows a normal distribution with only 2.5 percent producing a t-statistic above 1.96. This suggests that the causal test of social interaction on the disposition effect is unlikely to produce false positive results. The introduction of the social network likely exacerbates the disposition effect.

4 Suggestive Evidence that Social Interaction Promotes the Disposition Effect

Friendships Formation

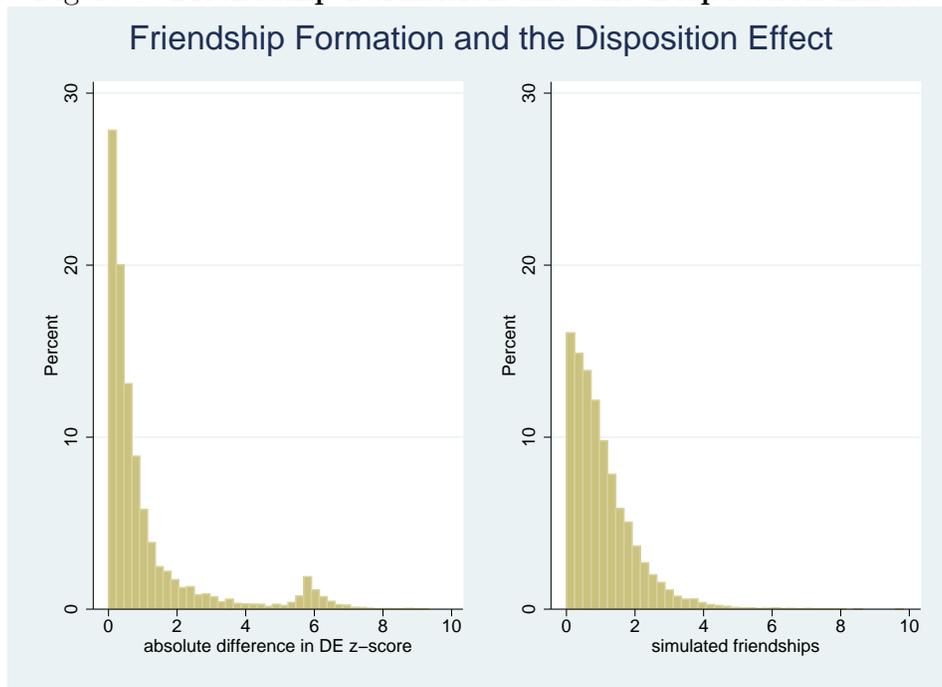
The dataset includes the complete topology of traders in the myForexBook network. Individuals with similar levels of the disposition effect tend to associate with one-another, which suggests a feedback effect that reinforces bad trading behavior.

I estimate the following regression for each individual j

$$sale_{it} = \beta_0 + \beta_1 \cdot gain_{it} + \varepsilon_{it}, \quad (3)$$

and collect the coefficient β_1 , which represents each trader's idiosyncratic susceptibility to the disposition effect. The regression is estimated using only post-myForexBook data and includes the same controls as earlier regressions (trader experience, trading approach, the use of passive orders, and so forth), which suggests the distribution of β_1 accounts for a number of contemporaneous factors which may explain friendship formation among like-pairs. For the 2,598 traders used in the regression analysis, the coefficient β_1 has a mean of 0.038, standard deviation of 0.16, skewness equal to 1.1, and kurtosis equal to 18.8. I use these parameters to conduct a thousand simulations of a randomly-drawn network composed of 15,030 friendships, the same number in the actual data when restricted to those in the trimmed sample.

Figure 6: **Friendship Formation and the Disposition Effect**



Description: The left panel presents a histogram of $DE dif_{jk} = |\beta_1(j) - \beta_1(k \neq j)|$, where $\beta_1(j)$ is a coefficient measuring the idiosyncratic disposition effect for trader j drawn from the regression $sale_{it} = \beta_0 + \beta_1 \cdot gain_{it} + \varepsilon_{it}$. The right hand panel presents a similar histogram drawn from a simulated random network, which is parametrized using the same number of friendships and the same distribution (up to the fourth moment) of β_1 .

The left panel in Figure 6 presents a histogram of

$$DE dif_{jk} = |\beta_1(j) - \beta_1(k \neq j)| \quad (4)$$

which is the absolute difference in the idiosyncratic disposition effect for any pair of traders. The right hand panel presents the results from simulating the network. I sort $DE dif_{jk}$ in each simulation in order from smallest to largest and take the row-average across the thousand simulations. The histogram of actual friendships has a larger mass concentrated

towards zero, which suggests that traders who are similarly susceptible to the disposition effect tend to cluster together.

Broadcasting Returns

If traders dislike admitting failures, and their aversion to losses grows stronger when introduced to a social environment, it would suggest that traders subject to the disposition effect try not to draw attention to their trading biases. Indeed traders that are highly susceptible to the disposition effect tend to send fewer messages after joining myForexBook. A one standard deviation increase in $\beta_1(j)$ is associated with a 0.15 standard deviation reduction in the number of messages sent by trader j , a relationship that is statistically meaningful. In unreported analysis, the estimated coefficient is robust to a number of individual level control variables.

5 Alternative Explanations

Learning

Rational learning by trading may explain the disposition effect (Feng and Seasholes (2005)). Contrary to this argument, myForexBook would appear to be a venue in which traders gain greater access to information about trading strategies and the true distribution of returns. This would suggest that the disposition effect falls after traders join the network, which is opposite of this paper's findings. A formal test also suggests that trading experience is unlikely to explain the relationship between the disposition effect and social interaction.

Table 2: **The Disposition Effect by Trader Experience**

Description: This table plots the results from estimating the following regression: $sale_{ijt} = \beta_0 + \beta_1 \cdot gain_{ijt} + \beta_2 \cdot postFB_{ijt} + \beta_3 \cdot gain_{ijt} \cdot postFB_{ijt} + \varepsilon_{ijt}$. Regressions are estimated by trader experience which is self-identified and limited to the following buckets by the operators of the social network. Standard errors are double-clustered by trader and week.

	experience (years) =			
	0 (1)	1-3 (2)	4 (3)	5+ (4)
$sale_{ijt}$				
$gain_{ijt}$	0.0233*** (0.0024)	0.0231*** (0.0028)	0.0187*** (0.0045)	0.0204*** (0.0035)
$postFB_{ijt}$	-0.00862** (0.0034)	-0.00701 (0.0052)	0.0151* (0.0089)	-0.00782 (0.0063)
$gain_{ijt} \times postFB_{ijt}$	0.00707** (0.0033)	0.0210** (0.010)	-0.000724 (0.0076)	0.00690 (0.0044)
$limit\ order_{ijt}$	-0.0175*** (0.0033)	-0.0108** (0.0050)	-0.0147** (0.0057)	-0.0177** (0.0070)
$gain_{ijt} \times limit\ order_{ijt}$	0.00756** (0.0035)	0.00256 (0.0035)	0.00465 (0.0050)	0.00354 (0.0064)
<i>constant</i>	0.153*** (0.0091)	0.122*** (0.0082)	0.120*** (0.017)	0.117*** (0.016)
week FE	Yes	Yes	Yes	Yes
$holding\ period_{ijt}$	Yes	Yes	Yes	Yes
approach FE	Yes	Yes	Yes	Yes
N	1,833,847	3,822,824	658,284	1,100,307
adj. R^2	0.027	0.023	0.030	0.022

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2 presents results from estimating Equation 2 separately by trader experience level. Traders self-identify their level of experience and choose one of four categories: 0 years, 1 to 3 years, 4 years, or 5 years. The regression results suggest that the least experienced traders, presumably the ones with the most to learn, are the most influenced by the social network. Regressions using the 0 year and 1 to 3 year sample both have positive and statistically significant coefficients on the interaction term between $gain_{ijt}$ and $postFB_{ijt}$,

while the latter two groups are statistically indistinguishable from zero. This result suggests that social networks may exacerbate the behavioral biases of the most susceptible traders.

Blame Delegation

In recent research, (Chang, Solomon, and Westerfield (2013)) show that investors exhibit a reserve disposition effect in their ownership of delegated assets. By entering the social network, it is possible that traders adopt strategies from other individuals and use them either profitably or unprofitably. Doing so would suggest that traders can assign blame to others, which would make them more reluctant to realize losses. However, this paper finds precisely the opposite: the disposition effect is stronger after joining the social network.

Adverse Selection

Similar to Linnainmaa (2010), limit orders are less likely to execute, but are more prone to the disposition effect on average. According to the main regression results, the disposition effect for limit orders is indistinguishable from zero following network entrance. This may reflect a shift towards the use of aggressive market orders as the social network may enable a false sense of belief in the need for immediacy. Regardless, this result is somewhat more difficult to interpret, but network entrance may reflect increased access to order-flow information which would help curb information asymmetries associated with adverse selection. However, accounting for limit orders in all regressions offers an improvement over existing studies and helps provide a cleaner test of the social network's influence on the disposition effect.

Transaction Costs

Transaction costs are minimal in foreign exchange. There are no fixed fees. Brokerages act as market makers earning the spread on each transaction, which tends to average no more

than a few pips on major currency pairs. Thus, transaction costs do not increase in any way following a trader's entry into the social network.

Mean-Reversion

Social interaction may exacerbate a belief in mean-reversion. The traders in myForexBook state their preferred trading strategy upon joining the social network. myForexBook limits the responses to *News*, *Momentum*, *Technical*, *Fundamental*, and *None Specific*. The strategies can roughly be ranked in order of a revealed belief in mean-reversion. Fundamental traders believe the most in mean-reversion, while Momentum traders believe the least. Technical and News-based strategies would presumably fall somewhere in between.

Table 3: **The Disposition Effect by Trading Strategy**

Description: This table plots the results from estimating the following regression: $sale_{ijt} = \beta_0 + \beta_1 \cdot gain_{ijt} + \beta_2 \cdot postFB_{ijt} + \beta_3 \cdot gain_{ijt} \cdot postFB_{ijt} + \varepsilon_{ijt}$. Regressions are estimated by self-identified trading strategy which is limited to the following buckets by the operators of the social network. Standard errors are double-clustered by trader and week.

	trading strategy =				
	fundamental (1)	momentum (2)	news (3)	technical (4)	none specific (5)
$sale_{ijt}$					
$gain_{ijt}$	0.0137*** (0.0041)	0.0281*** (0.0060)	0.0243*** (0.011)	0.0200*** (0.0020)	0.0301*** (0.0042)
$postFB_{ijt}$	-0.0256** (0.0084)	0.0102 (0.0076)	-0.0104 (0.0081)	-0.00204 (0.0040)	-0.0111 (0.0036)
$gain_{ijt} \times postFB_{ijt}$	0.0152** (0.0069)	0.0111 (0.0074)	0.00603 (0.011)	0.00598** (0.0026)	0.0275** (0.0112)
<i>constant</i>	0.165*** (0.010)	0.150*** (0.013)	0.156*** (0.014)	0.170*** (0.019)	0.162*** 0.014
week FE	Yes	Yes	Yes	Yes	Yes
$holding\ period_{ijt}$	Yes	Yes	Yes	Yes	Yes
experience FE	Yes	Yes	Yes	Yes	Yes
N	306,054	314,996	125,425	4,703,473	1,416,744
adj. R^2	0.027	0.030	0.031	0.024	0.027

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Empirical evidence suggests that the social network does not have much of an effect on expectations of mean-reversion. Table 3 presents estimates of the regression in Equation 2 sorted by a trader’s preferred strategy. The coefficient on the interaction term between $gain_{ijt}$ and $postFB_{ijt}$ is positive in all regressions. The coefficient estimate is statistically significant at the five percent error level when the trader chooses fundamental, technical, or does not have one specific strategy. While positive in both cases, the estimate is not statistically different from zero when the trader follows news or momentum strategies. However, it is difficult to rule out the possibility that this result is caused by a loss of statistical power when clustering the standard errors by trader, for which there are far fewer observations.

6 Conclusion

This research finds that social interaction makes behavioral biases even worse. In particular, social interaction increases the tendency for traders to hold onto losses, which leads to the disposition effect, a puzzling deviation from rational trading behavior frequently documented across investors of all types and on a variety of asset classes. To document this relationship, this research uses the introduction of an online social networking platform into the world of retail trading. The social networking features were introduced to traders on different brokerages over time at a staggered rate, which allows for causal identification. The findings are consistent with recent research suggesting that social interaction can influence the level of risk-aversion (Ahern, Duchin, and Shumway (2013)), but this paper’s findings suggest the effect is more pronounced in the loss region. The reluctance to realize losses is likely driven by an aversion to admitting defeat in front of others.

As a final consideration, this paper contributes to a growing literature which suggests that potentially welfare-improving changes to the financial sector can lead to bad behavior among household or individual investors. Mullainathan, Noeth, and Schoar (2012) provide evidence

that financial advisers reinforce the behavioral biases of their clients. Barber, Odean, and Ahmed (2013) suggest that allowing individuals greater choice over the allocation of their retirement funds may cause the social security system to be underfunded. This paper is similar: opening up the channels of communication between traders may not lead to efficient information flows as a rational model would suggest. Instead, social interaction exacerbates harmful behavior.

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