Chapter 1

Peer attention and the disposition effect

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Abstract

Social trading platforms allow investors to interact with each other. This paper studies the impact of peer attention on social trading platforms on investors' disposition effect. Using a difference-in-differences approach, I find a significant increase in the disposition effect when investors receive attention from their peers. This disposition effect increases as the number of other investors distributing likes to one another's trading decisions increases. This effect is driven both by holding on to losing positions longer and by closing winning positions faster. This finding may be explained by social facilitation theory. In the presence of others, investors want to achieve superior outcomes and limit their losses.

Keywords: Social trading, transparency, disposition effect, online trading platforms.
JEL Classification: D14; G11; G23; G24.

Contents

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1.1 Introduction

Recently, the emergence of social trading platforms, which are combinations of online trading and social media networks, has created a novel transparent environment. In fact, several contributions for investors analyze the influence of transparency in a "scopic regime"[1] (Gemayel et al., 2018a; Liêu et al., 2020; Lukas et al., 2017) on investors' behavioral biases, such as the disposition effect.[2] However, the evidence is mixed. Heimer (2016) documents that the disposition effect is twice as pronounced when investors begin to trade open to the public. In another setting, Pelster et al. (2018) show that this tendency increases even further when investors become signal providers (leaders) and are accepted as peer-to-peer advisors. In contrast, Gemayel et al. (2018a) and Lukas et al. (2017) provide empirical evidence for a smaller disposition effect of signal providers in a social trading environment.

Gemayel et al. (2018a) argue that differences in monetary compensation for signal providers may serve as a potential explanation for the different findings. Similar to professional fund managers, social traders, who are being copied by other investors, manage others' capital and receive monetary compensation from the brokerage services in relation to their number of copiers and the assets under management. The existence of monetary compensation introduces incentives for rational leaders to adjust their behavior in a way that maximizes their assets under management and retains their copiers. Additionally, deciding on behalf of others and being responsible for the financial outcomes of others introduce an additional psychological mechanism apart from the image concerns introduced by the transparency of the scopic regime (Hermann et al., 2017).[3] Indeed, the increase in behavioral bias may be explained by the sense of responsibility of leaders toward followers (Pelster et al., 2018) or by a delegation effect (Chang et al., 2016). Hence, an increase in investors' disposition effect may be driven by economic incentives (i.e., the more followers copy investors, the more compensation they receive) and responsibility concerns, whereas the scopic regime decreases investors' disposition effect.

This paper contributes to the literature on the disposition effect in a social setting concerning four main points. First, this paper addresses the prior debate on the role of monetary incentives in the disposition effect in a transparent environment. I study the impact of transparency[4] in a setting without monetary incentives and responsibility concerns. I specifically investigate the impact of investors receiving attention by means of "likes" and comments (on social trading platforms) on their disposition effect. Receiving likes and comments is unrelated to any monetary incentives for both senders and receivers. Nonmonetary

[1] According to Gemayel et al. (2018a), a scopic regime designates a state of permanent reciprocal observation and scrutiny among participants.

[2] The disposition effect describes the tendency of investors to sell winning positions too early while holding onto losing positions too long (Shefrin et al., 1985).

[3] Relatedly, Rau (2015) shows that the disposition effect is higher in team decisions.

[4] I use the terms "transparency" and "information transparency" interchangeably in this paper.

incentives help differentiate this setting from those of prior studies where social attention goes along with monetary incentives (Gemayel et al., 2018a; Lukas et al., 2017). I define the event of receiving social attention as the first time investors receive a like or comment from their peers. The first time receiving a like or comment could stir strong emotions among investors, which could trigger the psychological effect of being observed that leads to an increase in the disposition effect, independent of monetary incentives. In this analysis, I find a positive relationship between receiving social attention and the disposition effect. This effect increases as the size of the audience of investors distributing likes to one another's past trading activities increases.

As the second contribution, I confirm and clarify the influence of social attention on investor behavior. In fact, social networks have had an enormous impact on human behavior and human performance, such as satisfaction with life (Kim et al., 2011), the social esteem and well-being of adolescents (Valkenburg et al., 2006), and interaction overload and loneliness (Burke et al., 2010). Similarly, a lot of studies identify a peer effect on investors' decisions on social trading platforms (see, e.g., Berger et al., 2018; Cooper et al., 2011; Gemayel et al., 2018a; Heimer, 2016; Kromidha et al., 2019; Pelster et al., 2019, 2018; Rau, 2015). To clarify the role of social attention, I refer to *social facilitation theory*[5] as an explanation for the variation in the disposition effect under the presence of others.

The third contribution is the study of the mechanism behind the disposition effect. By observing holding periods of losing positions and winning positions separately, I show that the disposition effect is driven both by holding onto losing positions longer and by closing winning positions faster. Particularly, an increase in the amount of attention is associated with both a shorter holding period for positive positions and a longer holding period for negative position.

The last contribution is an investigation on the duration of the peer attention impact on the disposition effect. After receiving peer attention, the disposition effect immediately emerges and remains at high levels for approximately three months. Then, it takes almost nine months for the disposition effect to decrease to previous levels. Thus, the impact of peer attention on the decision-making process of investors can remain for a while.

To the best of my knowledge, this work is the first to study the impact of peer attention on online trading platforms on the disposition effect, without monetary incentives. The results show that the attention an investor receives exacerbates her disposition effect. Moreover, this increase is driven by the social aspect of the platform and not related to any economic benefit. Thus, these findings can be viewed as a complement to the findings of Heimer, 2016, Lukas et al., 2017, Pelster et al., 2018, and Gemayel et al., 2018a. The impact of peer attention on investors' disposition effects is quite persistent. Additionally, this effect is driven by both holding losing positions longer and selling winning positions faster.

[5] *Social facilitation theory* states that people who are being inspected by their community act differently (Sanders, 1981)

The remainder of this paper is structured as follows. The next section briefly summarizes the theoretical background and derives the empirical predictions. The third section describes the data and presents the summary statistics. The fourth section presents the empirical results. The last section summarizes the findings and concludes the paper.

1.2 Theory and empirical predictions

1.2.1 Social trading, information transparency and the disposition effect

A social trading platform is a combination of a social network and a broker service. On such a platform, information about trades and traders is publicly disclosed. Furthermore, investors may interact with each other through a network, share information, follow others and copy the trades of others. Because of this active transparency mechanism, social trading platforms bring about many social effects and have become an attractive topic for many recent studies. For example, the herding effect increases to an excess level due to transparency (Gemayel et al., 2018b). Glaser et al. (2018) find evidence of a positive relationship between transparency and investors dynamics. Similarly, Pelster et al. (2019) indicate that investors become more active and increase their trading activities when they receive attention from their peers.

Social trading platforms could provide significant short-term excess returns (Oehler et al., 2016). However, Oehler et al. (2016) also assert that social trading platforms do not help investors realize higher performance in the long term. Higher excess returns in the short term actually reflect the disposition effect. Glaser et al. (2018) find that owing to full transparency in trading portfolios, traders try to improve their win-ratio performance to impress the community and receive attention. Consequently, traders avoid losses and focus on executing winning trades in the short term.

In fact, the relationship between transparency on social trading platforms and the disposition effect is determined in many studies (see, for example, Gemayel et al., 2018a; Heimer, 2016; Lukas et al., 2017; Pelster et al., 2018). Nonetheless, the results (of these studies) are disputed due to differences in research settings. In particular, Heimer, 2016 observes the difference between investors who join a social trading platform and those who are contemporaneously constrained to join the network, while Gemayel et al., 2018a compare the disposition effect between the social trading platform and the traditional market to observe the impact of a transparent environment on investors. However, the setting of Heimer, 2016 arguably suffers from a selection bias due to the fact that investors who join the network could enjoy better investment performance than those who do not (Gemayel et al., 2018a). At the same time, the setting of Gemayel et al., 2018a raises the problem that the difference in platform settings may impact the decision of managers. Without controlling for the differences in frames, the reactions of investors could be driven by many factors in addition to transparency.

This study, therefore, focuses on social attention on social trading platforms, that is, receiving the first like or comment. By comparing the disposition effect on the same platform using a matching technique, I can eliminate the bias caused by selection and different frames.

Although this study and the study of Lukas et al. (2017) share similar settings, where both observe the difference in the disposition effect of investors in two phases of the same platform to eliminate the effect of the different frames, this study shows some important differences. The setting of Lukas et al. (2017) is associated with monetary incentives. Additionally, in their study, investors can decide when to publish their investment information. This feature makes investors more proactive before the transparency period. The preparation in advance of social exposure could help investors better concentrate on their investment targets. However, under the passive situation of being observed, the behavior of investors could be more affected by the effect of peer attention than it could in a proactive situation. Thus, I am convinced that my setting without monetary incentives and a potential preparation for receiving attention could help determine the impact of transparency on the disposition effect.

1.2.2 The disposition effect and social facilitation theory

In the literature, the disposition effect is explained by a large range of theories according to Shefrin et al., 1985. For example, prospect theory (Tversky et al., 1981), mental accounting (Thaler, 1999), self-control, pride seeking, regret avoiding, or cognitive dissonance (Chang et al., 2016) can explain the disposition effect. While the aforementioned theories explain why investors are exposed to the disposition effect, recent studies have suggested the role of social interactions in this effect (see, for example, (Gemayel et al., 2018a; Heimer, 2016; Lukas et al., 2017; Pelster et al., 2018)). I further elaborate on this relationship and conjecture that the disposition effect is more explicit in a transparent social environment due to the influence of social facilitation theory.

Social facilitation theory is an enhanced theory concerning the dominant responses of organisms to the simple physical presence of species mates. More precisely, social facilitation refers to the tendency to behave and perform differently when being observed, compared to in isolated situations. There is a wide range of prior studies that examined this phenomenon and provided three explanations for socially facilitated behavior, namely, mere presence, learned drive, and distraction or conflict.

According to mere presence (Triplett, 1898; Zajonc, 1965) and learned drive (Cottrell et al., 1968; Paulus et al., 1971; Weiss et al., 1971), the sense of being observed induces social facilitation, which leads investors to look forward to being socially accepted or protecting their self-images. On social trading platforms, this argument is supported by Lukas et al. (2017) and Gemayel et al. (2018a). These studies show that transparency and social context make investors more precautionary when trading. Therefore, investors follow cutting-loss strategies and profit targets and reduce their disposition effect. From a different viewpoint, good performance could be evaluated by the number of

successful trades. Consequently, investors could immerse themselves in the disposition effect because the success of each trade with the influence of mental accounting creates the feeling of successful investing. This feeling then drives investors to execute more winning trades but also hold onto losing trades. Following this argument, mere presence is in line with the findings of Heimer, 2016 and Pelster et al., 2018.

In reality, it is difficult for investors to resist the attraction of winning trades. Moreover, the satisfaction of realizing gains and the regret of selling at a loss could allow investors to compromise between their prior targets and increase their winning trades. Additionally, the inflation of the disposition effect has also been explained by the fear of reputation loss (Pelster et al., 2018). Therefore, I lean on the conjecture that mere presence and learned drive enhance the disposition effect. Investors may quickly sell their winning positions, aiming at preserving their positive performance, because the positive position signals their success to others. Similarly, investors may want to keep their losing positions open to prevent them from admitting their poor investment decisions. Such reactions directly exacerbate the disposition effect. I propose the first hypothesis that the disposition effect increases when investors receive attention from their peers for the first time.

In contrast to mere presence and learned drive, Jones et al. (1967), Sanders et al. (1975), and Hilgard et al. (1961) suggest that the presence of others leads to distraction. Especially, the distraction of the physical presence of others has two distinct influences on task performance: (1) a curvilinear effect on simple task performance, which leads to improvement, and (2) a monotonic impairment that results in complex task performance compared to baseline levels. Additionally, the level of distraction also has an influence on performance (Sanders, 1981). In the investment context, the size of audiences could correspond to the level of distraction due to an increase in the pressure placed on investors. More precisely, a larger audience pushes investors to a higher level of pressure to protect their self-images with respect to many others. Thus, I propose the second hypothesis that the size of the audience provokes a larger disposition effect.

Combining previous literature with my prior arguments, I raise the following hypotheses and dedicate the rest of this study to empirically testing them.

Hypothesis 1: The disposition effect increases when investors receive attention from their peers for the first time.

Hypothesis 2: The disposition effect increases when the size of the audience increases.

1.3 Methodology and data

1.3.1 Esocialtrading platform

This study on the relation of peer attention and the disposition effect is conducted using data collected from a social trading platform—denoted as *Esocialtrading*—to preserve the anonymity of the data provider. Esocialtrading allows its investors to start their trading activities easily without any explicit account

opening fees, except for a required deposit amount. The platform provides a standard social network for trading, where investors can receive updates from other traders by following their news feed. Every trader can post information, explain investment decisions, or share any other kind of knowledge with the Esocialtrading community and obtain feedback. This sharing mechanism provides a social channel for all investors during their decision-making process.

This news feed feature of the platform facilitates communication among traders, while the communication log records provide an ideal data source for conducting an analysis on the impact of social attention. Investors can follow others and observe others' portfolios and investing results. Information transparency increases the trust of traders but also places pressure on traders to perform well in front of their followers. Simultaneously, this feature allows me to extract the trade execution information of traders to estimate their trading behavior and disposition effect.

Importantly, investors on platforms invest their own money, which provides performance-aligned incentives. Therefore, the influence of peers seems to be purer than on other trading networks or forums that do not require putting money on the line.

I collect all trades and social activities from $145,792$ users executed between 2012 and 2015. The data are averaged per month. This sample contains a total of $1,584,280$ investor-months.

1.3.2 Data description

[Place Table 1.1 here]

	Gender			**Age Range**						
	Female	Male	Missing	18-24	25-34	35-44	45-54	55-64	>65	Missing
Freq	23,206	104,882	17,704	7,726	50,861	36,794	17,495	8,171	5,221	19,524

This table reports the distribution of gender and age across traders. In total, the data include 145,792 users.

Table 1.1: Summary statistics of demographics

Table 1.1 reports the demographic information from the data. I focus on gender and age range since these traits can lead to different psychological behaviors in terms of the disposition effect (Gächter et al., 2007; Rau, 2015). In this dataset, male investors account for a visibly larger part, with 104,882 investors. The majority of investors, consisting of approximately 87,000 traders, range from 25 to 44 years old.

I lack demographic information on several investors. However, in the fixed individual effects regressions used below, the missing data do not have any impact on the regression models.

1.3.3 Variables

The main dependent variable of this model is the *disposition effect*, based on the notation and estimation introduced by Odean (1998). I count the trades that are closed at a profit (loss) as realized gain (realized loss). Additionally, I count the trades that are not closed at a price that is higher (lower) than the purchase price as a paper gain (paper loss). The magnitude of the disposition effect is then quantified by the difference between the proportion of gain positions and that of loss positions. To this end, the disposition effect is formulated as follows:

$$Dispositioneffect = \frac{Realized\_gains}{Realized\_gains + Paper\_gains} - \frac{Realized\_losses}{Realized\_losses + Paper\_losses} \tag{1.1}$$

The summary statistics are presented in Table 1.2. In particular, the average of the *disposition effect* is approximately 0.36, which indicates that investors are more likely to realize gains than losses in their portfolios and that investors generally have exposure to the disposition effect.

[Place Table 1.2 here]

I use the following explanatory and control variables. For each month, I count the number of other users who pay attention to an investor, denoted as *Peer attention*. The variable *No. of followed traders* is defined as the number of traders that an investor follows. To control for the trading behavior of investors, I use the following variables: *No. of trades*, which is the number of transactions of each investor in a specific month; *Leverage*, which determines the level of leverage used by investors; *Average investment*, which denotes the average fraction of total assets deposited with an online broker invested in each trade; and a dummy variable, *Diversification*, which takes the value of one if investors invest less than 20% of their budget in one transaction and zero otherwise.

To determine investing performance, I include three variables: *Mean ROI*, *SD ROI* and *Average losing*. *Mean ROI* and *SD ROI* measure the mean and standard deviation of returns of individual trades, respectively. *Average losing* calculates the proportion of losing trades of all executed trades in the specific month. Most investors realize losses in the observation period (as presented in Table 1.2).

To measure the experience of investors, I create the dummy variable *Inexperienced*. This dummy variable takes a value of one if an investor has traded on the platform in a duration, counting by months, greater than the median duration of all the traders on the platform and zero otherwise.

Variables	Mean	SD	Pct(25)	Median	Pct(75)	N
Disposition effect	0.359	0.333	0.089	0.382	0.618	1,584,280
Peer attention	0.575	9.873	0	0	0	1,584,280
No. of followed traders	1.872	2.490	0	1	2	1,584,280
Holding time	234.095	504.520	25.826	73.880	200.367	1,584,280
Leverage	92.264	88.060	36.500	67.887	100.000	1,584,280
Average investment	11.940	19.657	0.978	3.200	13.208	1,584,280
No. of trades	13.953	33.150	0	0	10	1,584,280
No. of instruments	6.458	5.903	2	5	9	1,584,280
Mean ROI	-0.017	0.164	-0.0005	0.003	0.013	1,584,280
SD ROI	0.195	0.585	0.008	0.034	0.126	1,487,770
Average losing	0.246	0.243	0.046	0.183	0.375	1,584,273

This table shows the summary statistics of the trading data. *Disposition effect* denotes the disposition effect of investors by month; *No. of followed traders* denotes the number of traders who are being followed by users in a given month; *Peer attention* denotes the number of other investors who pay attention to a user in a given period; *Holding time* calculates the interval between the opening and closing of a position in hours; *Leverage* stands for the average leverage used for trades; *Average investment* denotes the average fraction of total assets deposited with an online broker invested in each trade; *No. of trades* denotes for the number of transactions executed in a given month; *No. of instruments* denotes the number of instruments employed each month; *Mean ROI* denotes the average return on investment; *SD ROI* stands for the standard deviation of return on investment; and *Average losing* denotes the average fraction of losing trades. In total, the sample contains 1,584,280 user-months from 145,792 users.

Table 1.2: Summary statistics of trading data

1.3.4 Methodology

To study the influence of social interactions on the disposition effect, I proceed as follows. I concentrate on traders who receive attention from their peers for the first time during the sample period. I choose the first time receiving attention due to the high impact of the "first-time emotion". While receiving likes or comments does not reflect the trading performance of investors, this social attention could enhance the psychological effect of being observed. Precisely, in this setting, the treatment group (*Treatment_group*) consists of traders who receive likes and comments from their peers. Other traders, who do not receive any likes or comments, constitute the control group.

Then, I apply a standard difference-in-differences (DID) technique to isolate the effect of social attention on the disposition effect. Note that survival analysis is considered suitable for time-stamped data as transaction data (Gemayel et al., 2018a). However, Heimer (2016) indicates that using the Cox model (which is a popular survival analysis method) and an OLS panel regression with trader and time fixed effects give similar results. Moreover, the Cox model may suffer from

an incidental parameter problem due to applying maximum likelihood estimation (Heimer, 2016; Lancaster, 2000). Thus, the discrete phase method is applied in many studies related to the disposition effect (Heimer, 2016; Lukas et al., 2017; Pelster et al., 2018). Therefore, a DID approach is appropriate for answering these research questions.

1.3.5 Matching

When applying the DID approach, the matching procedure is important to match the control and treatment observations (Atanasov and Black, 2016). The matching process reduces potential selection bias, which may be caused by investors selecting specific peers to which to allocate their attention. With the matching technique, I aim to find comparable investors who do not receive attention from their peers at a given point in time who exhibit similar trading characteristics compared to their treated peers. I match investors based on four groups of variables. These are (1) several lags of trading intensity, (2) several lags of the disposition effect, (3) trading characteristics and (4) demographic information. The group of characteristics includes *Holding time*, *Leverage*, *No. of followed traders*, *Mean ROI*, and *No. of instruments*, and the demographics include the *Gender* and *Age* of investors. Investors are matched using a nearest-neighbor matching approach, which matches the untreated observations based on their propensity score to treated subjects. The matched data are summarized in Table 1.3.

[Place Table 1.3 here]

Overall, the matching result is good, as the treated and control investors are rather similar after matching. Figure 1.1 visualizes the outcome of the matching routine.

[Place Figure 1.1 here]

1.4 Empirical analysis and results

1.4.1 The disposition effect and demographics

I analyze the disposition effect according to two demographics variables—gender and age range. These demographic factors may explain the variation in the psychological behavior of investors, which causes the disposition effect. Table 1.4 reports the summary statistics of the disposition effect by demographics. Female investors exhibit a higher disposition effect than do their male counterparts, which may be caused by the fact that females have a higher level of risk aversion than do males (Rau, 2015). I conduct a Wilcoxon test for the differences in the disposition effect by gender, which rejects the null hypothesis (p_value = 0.00). This result indicates that there is a statistically significant difference between the disposition effect of women and that of men.

	Means Treated	Means Control	SD Control	Mean Diff	eQQ Med	eQQ Mean	eQQ Max
Distance	0.0767	0.0765	0.0460	0.0002	0.0002	0.0002	0.0035
L1 Trades	30.7051	31.7136	47.8655	-1.0085	1.0000	1.9196	14.0000
L2 Trades	17.7222	18.8322	36.0237	-1.1100	1.0000	1.9741	13.0000
L3 Trades	12.9365	13.9863	31.6490	-1.0497	0.0000	1.9996	26.0000
L1 Dispo	0.3834	0.3815	0.3076	0.0020	0.0121	0.0116	0.1512
L2 Dispo	0.2340	0.2331	0.3189	0.0009	0.0195	0.0376	0.2167
L3 Dispo	0.1702	0.1679	0.2994	0.0023	0.0134	0.0379	0.2947
Log(Avg. Holding)	3.9151	3.8673	1.4037	0.0478	0.0319	0.0501	0.4335
No. of followed traders	3.4004	3.3339	3.7930	0.0665	0.0000	0.1247	1.0000
L1 ROI	-0.0120	-0.0124	0.1377	0.0004	0.0008	0.0045	0.1406
L1 Leverage	108.7390	111.5003	86.6832	-2.7613	2.0188	3.1060	19.2083
No. of instruments	9.9348	9.9796	7.4396	-0.0447	0.0000	0.5806	30.0000
Female	0.1586	0.1623	0.3687	-0.0037	0.0000	0.0037	1.0000
Male	0.8414	0.8377	0.3687	0.0037	0.0000	0.0037	1.0000
Age 18-24	-0.1538	-0.1540	0.2660	0.0002	0.0000	0.0036	0.2390
Age 25-34	-0.2115	-0.2075	0.2719	-0.0040	0.0000	0.0040	0.6547
Age 35-44	0.2247	0.2237	0.3570	0.0010	0.0000	0.0026	0.5963
Age 45-54	-0.0708	-0.0734	0.4597	0.0026	0.0000	0.0026	0.7559
Age 55-64	-0.0109	-0.0047	0.4775	-0.0062	0.0000	0.0062	0.3150

This table shows the summary statistics of the matched data and a comparison of the control group and treatment group after matching.
L1 Trades, *L2 Trades*, and *L3 Trades* denote the one, two and three lags of the number of transactions executed in a given month, respectively. *L1 Dispo*, *L2 Dispo*, *L3 Dispo* denote the one, two and three lags of the disposition effect, respectively. *Log(Avg. Holding)* calculates the logarithm of the average interval between the opening and closing of a position in hours; *No. of followed traders* denotes the number of traders who are being followed by users in a given month; *L1 ROI* denotes the lagged term of the average return on investment; *L1 Leverage* stands for the lagged term of the average leverage used for trades; *No. of instruments* denotes the number of instruments employed each month; *Female* and *Male* indicate the gender of the observations; and *Age* denotes five age categories: 18-24, 25-34, 35-44, 45-54, and 55-64 years.

Table 1.3: Matched data

The results presented in Table 1.4 suggest that susceptibility to the disposition effect increases with age. This phenomenon may be explained by focusing on the link between age and loss aversion (Gächter et al., 2007). In particular, older investors usually go hand in hand with a higher career position and possess more assets. Their high positions restrict their willingness to admit their bad decisions, and thus, they are more reluctant to realize losses.

[Place Table 1.4 here]

Finally, Table 1.4 indicates that inexperienced investors tend to get more exposure to the disposition effect compared to experienced ones. This finding is in agreement with prior studies (Da Costa Jr et al., 2013; Hermann et al., 2017; Pelster et al., 2018). A Wilcoxon test indicates a statistically significant difference ($p\_value = 0.00$).

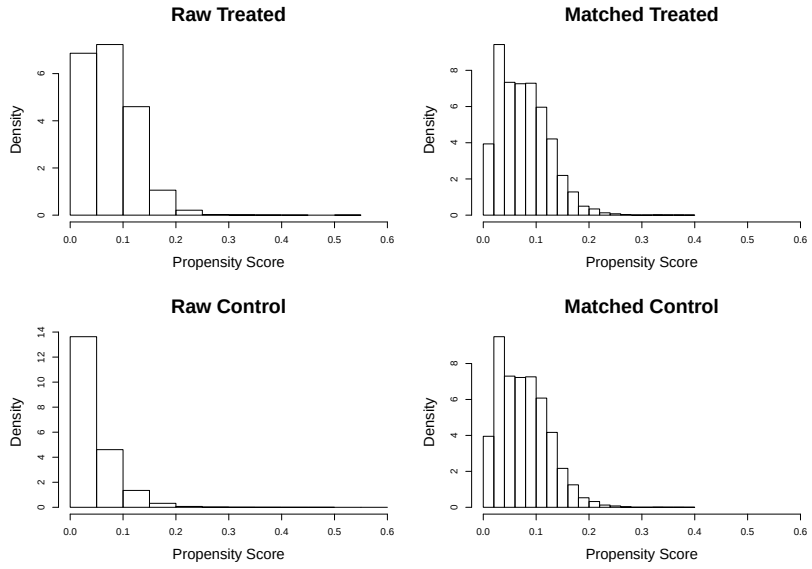

Figure 1.1: Histogram of matching

This figure shows the histograms of the treated and control groups before and after matching. The left panel shows the histogram of the data before matching, while the right panel shows the distribution of the matched data.

	Gender				Experience			
	Female		Male		Inexperienced		Experienced	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
DE	0.403	0.324	0.3398	0.332	0.3752	0.3240	0.3445	0.3410

		Age Range					
		18-24	25-34	35-44	45-54	55-64	>65
DE	Mean	0.2950	0.3367	0.3547	0.3673	0.3777	0.3828
	SD	0.343	0.337	0.329	0.326	0.323	0.328

* This table shows the disposition effect separately by gender and age range. *DE* denotes the disposition effect.

Table 1.4: Demographics and the disposition effect

1.4.2 The disposition effect and peer attention

To determine the impact of peer attention on the disposition effect, I next present the descriptive statistics of the disposition effect before and after the treatment time.

According the psychological laws, a salient event can stir the emotions of

humans for a while; however, this emotion eventually goes away. I expect that the influence of social attention disappears after a while. Therefore, I focus on the observation window of ten months before and after the event $[-10, 10]$, yielding a total of $284,235$ user-month observations.

[Place Table 1.5 here]

	Treated Receives									
Variables		Before			After		T test	p value	conf low	conf high
	Mean	SD	Obs.	Mean	SD	Obs.				
Disposition effect	0.36	0.33	60,146	0.40	0.31	224,089	-23.21	0.00	-0.04	-0.03
Holding time	202.51	470.43	60,146	179.72	408.41	224,089	11.75	0.00	18.99	26.59
Average losing	0.25	0.22	60,146	0.25	0.22	224,089	-0.95	0.34	-0.00	0.00
Mean ROI	-0.02	0.19	60,144	-0.02	0.20	224,064	0.29	0.77	-0.00	0.00
Peer attention	0.00	0.00	60,146	2.54	14.15	224,089	-43.97	0.00	-2.65	-2.42

This table shows the summary statistics of the monthly aggregated data for traders who receive attention for the first time only. The table reports the data separately for the period before and after receiving the first social attention. The table is restricted to an observation window of ten months before and after the event. The monthly data contain trading information from 284,235 user-month observations. *Disposition effect* denotes the disposition effect of investors by month; *Holding time* calculates the interval between the opening and closing of a position in hours; *Average losing* denotes the average fraction of losing trades; *Mean ROI* denotes the average return on investment; and *Peer attention* denotes the number of other investors who pay attention to a user in a given period.

Table 1.5: Trading characteristics around the treatment event

According to Table 1.5, the pre-event and postevent groups consist of $60,161$ and $224,089$ observations, respectively. In general, after receiving attention for the first time, the disposition effect of investors indicates an upward shift. Furthermore, I observe that these traders become more active and hold their positions for a shorter period than they previously did. This reaction could be seen as an attempt to achieve better performance. Moreover, this reaction leads investors to be more exposed to the disposition effect. Yet, there is no statistically significant difference in the investing performance of investors. Overall, this result supports the hypothesis that the disposition effect increases after investors receive attention for the first time.

To study the question of whether investors are influenced by the attention they receive from their peers, I use the DID approach, which allows us to

	Model 1	Model 2	Model 3
Treatment	0.04***	0.03***	0.02***
	(0.00)	(0.01)	(0.01)
Treatment ∗ Male		0.01	
		(0.01)	
Treatment ∗ Inexperienced			0.02***
			(0.01)
Controls	Yes	Yes	Yes
Trader Fixed Effects	Yes	Yes	Yes
Time Fixed Effect s	Yes	Yes	Yes
R^2	0.07	0.07	0.07
No. of Obs.	56,148	56,148	56,148

$^{***}p < 0.001$, $^{**}p < 0.01$, and $^{*}p < 0.05$.

This table reports the results from a difference-in-differences estimation on the disposition effect after investors received attention for the first time.
Treatment denotes the interaction of Treatment_group and Post_event. *Male* is a dummy variable equal to one if an investor is male and zero otherwise. *Inexperienced* is a dummy variable that takes a value of one if the investor has below-the-median experience and zero otherwise.
The control variables include *No. of trades*, *Leverage*, *Holding time*, *Diversification*, *No. of followed traders*, and *No. of instruments*.
No. of trades denotes for the number of transactions executed in a given month. *Leverage* stands for the average leverage used for trades. *Holding time* calculates the interval between the opening and closing of a position in hours. *Diversification* is a dummy variable that takes a value of one if investors invest less than 20% of their budget on a transaction and zero otherwise. *No. of followed traders* denotes the number of traders who are being followed by users in a given month. *No. of Instruments* denotes the number of instruments employed each month.

Table 1.6: Difference-in-differences estimation

rigorously analyze the disposition effect before and after first receiving attention. The DID regression model is formulated as follows:

$$\begin{aligned} Disposition_{it} =& \beta_1 \cdot Treatment\_group_i + \beta_2 \cdot Post\_event_{it} \\ &+ \beta_3 \cdot Treatment\_group_i \cdot Post\_event_{it} + \sum_{n=1}^{n} Control_{it} + u_{it}. \end{aligned} \tag{1.2}$$

The control variables include *No. of Trades*, *Leverage*, *Holding Time*, *Diversification*, *No. of Followed Traders*, and *No. of Instruments*.

Table 1.6 summarizes the results where Model 1 (Column 1) is the baseline version of the DID model, which is defined in Equation (2). β_3 captures the additional disposition effect of the treatment group after receiving peer attention.

[Place Table 1.6 here]

The statistically significant positive coefficients on *Treatment* in Table 1.6 support the first hypothesis that receiving peer attention increases the disposition

effect. An investor has a higher disposition effect after receiving attention, with an increase of approximately 0.04. Comparing the coefficient with the mean of the disposition effect in Table 1.2 shows that receiving attention is responsible for approximately 11% of the disposition effect. This value is highly economically significant. Furthermore, I want to test whether or not there are gender differences in terms of the disposition effect. To do so, in Model 2 (Column 2), I add the variable *Male*[6]. The results indicate that there are still significant differences in the disposition effect before and after receiving attention for the first time for both male and female investors. However, there is no statistically significant difference between the changing patterns of the two gender groups. In other words, men and women exhibit the same increase in the disposition effect due to receiving attention from their peers during the pre- and postevent periods. Model 3 (Column 3) includes the variable *Inexperienced* to indicate the discrepancy of inexperienced investors after receiving attention for the first time. The statistically significant coefficient amounts to 0.02 at the 1% level, which indicates the role of experience in eliminating the disposition effect and its sensitivity toward receiving attention from peers for the first time. This finding is consistent with previous evidence in the literature (Da Costa Jr et al., 2013; Heimer, 2016; Hermann et al., 2017).

1.4.3 The disposition effect and the amount of attention

[Place Table 1.7 here]

In this section, I seek the answer to the second hypothesis. I present the summary statistics of investors with respect to their attention groups. I assign investors to five groups based on the number of likes and comments that each investor received in a given month. Table 1.7 indicates that the amount of attention (the number of likes and comments) has a monotonic impact on the magnitude of the disposition effect and highlights that the average holding time of positions dramatically decreases with an increase in the amount of attention received.

Thus, Tables 1.5 and 1.7 provide a consistent indication that receiving attention from peers has a significant effect on the disposition effect of investors. Additionally, considering the investing behavior, these traders are more active after receiving attention from their peers for the first time. The level of activeness increases with the amount of attention an investor receives.

In Section 1.4.2, I focus on the disposition effect after the treatment event by applying the DID model. Now, I study further the impact of the amount of attention. To do so, I adopt Regression Equation (3) in which the disposition effect is used as the dependent variable, and the main independent variable is *Peer attention*.

$$Disposition_{it} = \beta_1 \cdot PeerAttention_{it} + \sum_{n=1}^{n} Control_{it} + u_{it} \qquad (1.3)$$

[6] *Male* is a dummy variable that takes a value of one for men and zero otherwise.

Variables	Attention											
	0		1		2		3		4		5	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Disposition effect	0.36	0.34	0.39	0.31	0.42	0.29	0.44	0.28	0.47	0.27	0.49	0.27
Holding time	239.20	512.26	171.19	404.19	151.98	346.07	143.54	328.18	129.95	267.59	140.69	288.95
Mean ROI	-0.02	0.16	-0.03	0.21	-0.03	0.21	-0.03	0.23	-0.03	0.23	-0.02	0.23
Average losing	0.25	0.25	0.25	0.20	0.24	0.18	0.22	0.18	0.21	0.16	0.19	0.16

This table shows the summary statistics of the monthly aggregated data from Table 1.2 with respect to the degree of attention received in that month. The variable definitions are as follows: *Group 0* (Peer attention = 0) includes 1,490,223 obs.; *Group 1* (Peer attention = 1) includes 30,600 obs.; *Group 2* (1 < Peer attention < 5) has 31,309 obs.; *Group 3* (5 ⩽ Peer attention ⩽ 7) includes 10,840 obs.; *Group 4* (7 < Peer attention ⩽ 20) includes 13,151 obs.; and *Group 5* (21 ⩽ Peer attention) includes 8,157 obs. *Peer attention* is the number of other investors who pay attention to a user in a given period. *Disposition effect* denotes the disposition effect of investors by month; *Holding time* calculates the interval between the opening and closing of a position in hours; *Mean ROI* denotes the average return on investment; and *Average losing* denotes the average fraction of losing trades.

Table 1.7: Attention and the disposition effect

Note that I expect that *Peer attention* has an increasing impact in a decreasing marginal pattern on the disposition effect. In other words, the first unit of attention typically has the strongest effect, and every additional unit of attention results in a smaller effect. This assumption is supported by the common behavior of humans that the first stimulation always impulses a much larger effect than later ones due to the adaption effect. Thus, if I consider the amount of attention as an independent variable, then it should have a diminishing marginal effect on the dependent variable. To measure this diminishing marginal effect, I scale *Peer attention* to log(1 + *Peer attention*).

[Place Table 1.8 here]

The results in Table 1.8 support the association between social attention and the disposition effect with a statistically significant coefficient. This result is in line with the expectation that the disposition effect is more exacerbated by larger amounts of attention. Since *Peer attention* is scaled to its log-transformed term, each percent increase in the actual amount of attention is in line with the 0.029 increase in the level of the disposition effect.

In Model 3 (Column 3 in Table 1.8), to estimate the influence of the amount of attention on the disposition effect, I include a set of dummy variables for each *Attention group*[7]. The regression result underlines the role of the amount of

[7] *Attention group* includes Attention Group 0 (*Peerattention* = 0); Attention Group 1 (*Peerattention* = 1); Attention Group 2 (1 < *Peerattention* < 5); Attention Group 3 (5 ⩽ *Peerattention* ⩽ 7) ; Attention Group 4 (7 < *Peerattention* ⩽ 20); and Attention Group 5 (21 ⩽ *Peerattention*). Peer attention denotes the number of other investors who pay attention to a user in a given period.

attention with regard to the disposition effect. I conclude that the more attention investors receive from their peers, the more exposure to the disposition effect they have. The magnitude of this effect increases by the amount of attention received. This result confirms the second hypothesis.

1.4.4 Peer attention and holding period

According to Tables 1.5 and 1.7, the holding periods of investors change after the treatment event. These changes connect with the idea that there is a relationship between the holding period and the period of being observed. Moreover, referring to the definition introduced by Shefrin et al. (1985), the disposition effect arises through two separate actions: keeping a losing position too long and selling a winning position too fast. This leads to two questions. (1) How does the presence of peer attention influence the holding period of investors? (2) Do investors react differently to winning and losing situations?

To answer these questions, I separate the trades of investors into winning and losing trades by using a dummy variable named *Positive*, which takes the value one for winning trades and zero otherwise. Then, I compute the average holding period for winning trades and losing trades, separately. On average, the holding time in the winning position is significantly shorter than that in the losing position (3.59 & 4.49) (using the Wilcoxon test $W = 4.95e + 7$ and $p\_value < 2.2e - 16$).

I use $log(1 + Holdingperiod)$ as the dependent variable in two variant models. I simultaneously apply time and individual fixed effects for the two variations. In Table 1.9, Column 1 considers the winning positions, while Column 2 focuses on the losing ones. Model 1 produces an estimated β_1 equal to -0.014 ($SE = 0.004$), as opposed to 0.002 ($SE = 0.006$) in the losing case of Model 2. The estimated coefficients are statistically significant in both specifications.

The estimation results in Table 1.9 directly utilize the holding period to estimate the relationship between receiving peer attention and the holding period. I observe that with winning positions, an increase in peer attention leads to a decrease in the holding period, while for losing positions, a larger amount of attention received leads investors to increase their holding period. The first tendency is a sensitivity of the rewarding system that motivates investors to quickly sell their winning positions, while the second one is a contradictory tendency of conscientiousness, which suppresses investors to patiently wait for higher returns. According to Cecchini et al. (2019), these two distinct reactions are caused by independent psychological tendencies.

[Place Table 1.9 here]

These results do not only confirm the increase in the disposition effect but also capture the reaction of traders to the presence of others. The separate reactions to winning and losing situations underline the desire of investors to display good performance. Investors have a high tendency to close their winning positions and are reluctant to sell their losing positions.

1.4.5 The evolution of the disposition effect after treatment

After showing the significant influence of social attention on the disposition effect, although the impact is both statistically and economically significant, we do not really know for how long this effect persists. In this section, I discuss additional analyses that examine the impact of social attention on the disposition effect in months after receiving attention.

[Place Figure 1.2 here]

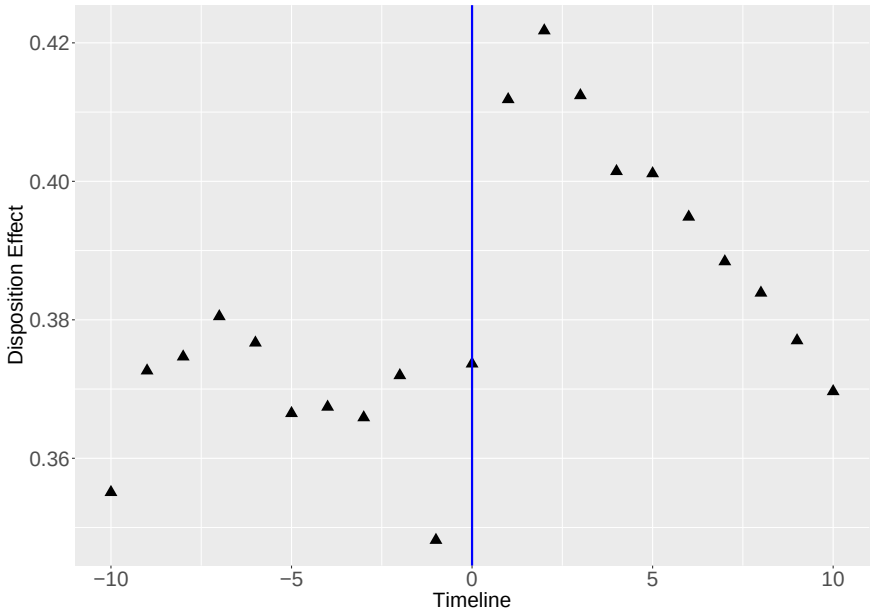

Figure 1.2: Investors' disposition effect before and after receiving attention for the first time

This figure shows the evolution of the disposition effect around the treatment time. The treatment time denotes the first time investors receive attention from their peers.

Figure 1.2 shows the evolution of the disposition effect around the treatment time. According to the figure, there are two separate trends before and after the treatment event. In the ex ante period, the disposition effect fluctuates around 0.38. However, there is a steep jump after the treatment event, which indicates that the disposition effect increases when social attention increases. During the periods after the treatment event, the disposition effect decreases; however, it is quite consistently at a higher level than before the event. As a consequence, I can conclude that the relationship between the disposition effect and peer attention is rather persistent.

Finally, I rerun the regression model (1.3) and include as a dependent variable the disposition effect in periods $T+1$, $T+2$, and $T+3$. T denotes the period in

which investors receive attention for the first time. Using a regression analysis with fixed effects and a group of control variables, I find statistically significant coefficients between the disposition effect at times $T+1$, $T+2$, and $T+3$ and the amount of attention of the current period.

This result is consistent with Figure 1.2 and supports the prior conclusions about the influence of social attention on the disposition effect. Moreover, I find statistical evidence to conclude that the impact of social attention increases the disposition effect for several periods after receiving attention for the first time. The decrease in the magnitude of the coefficients over the three models shows the attenuation of the effect over time (the results are presented in Table 1.10).

[Place Table 1.10 here]

1.5 Discussion and conclusion

The disposition effect in terms of investment is a pervasive bias that is relevant to almost all investors. There are many factors that drive the disposition effect. Although previous studies have identified the impact of transparency on the disposition effect, the disagreement in the findings motivates this study. In this paper, I reveal that the impact of social peer attention on the disposition effect, even in the setting without the presence of monetary incentives. In complement to prior research in related settings including when publishing one's account (Lukas et al., 2017), when comparing trade leaders and copiers (Gemayel et al., 2018a), when joining the network (Heimer, 2016) and when becoming a first-time financial advisor (Pelster et al., 2018), these results help confirm the consistency of the effect of social transparency on the disposition effect when receiving attention for the first time. This study further shows that the impact of social attention is even more severe when the amount of attention increases. Additionally, I find that peer attention has a long-term impact on the disposition effect in that it takes almost nine months to return to previous levels.

The relationship between peer attention and the disposition effect may be explained by social facilitation theory. The awareness of being judged by society puts investors under the psychological pressure of consistently performing well. These investors, therefore, try to quickly sell their winning positions to obtain real gains and hold their negative positions to prevent realizing losses. Then, the disposition effect is provoked. I document this behavior empirically. While investors shorten the holding time of their gain positions, they lengthen the holding time of their loss positions due to the ambition of increasing their outcomes in the presence of others.

These findings have at least two applications. First, receiving attention heavily impacts the behavior of investors, and therefore, understanding the existence of this effect could help investors improve their self-awareness. Skipping or hiding the announcement from attention (likes and comments) could also help investors lower this impact. Second, the impact of the amount of attention has a diminishing marginal effect. This information can be interpreted as investors

becoming used to receiving attention and becoming immune to its effect after a while. Experience is an important element that helps investors overcome social attention exposure, which is in agreement with prior studies indicating that learning and experience can indeed help investors improve their performance and reduce bias (Feng et al., 2005; Seru et al., 2010).

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Model	(1)	(2)	(3)
Log(1+ Peer attention)	0.029^{***}	0.010^{***}	
	(0.002)	(0.001)	
Attention group 1			0.013^{***}
			(0.003)
Attention group 2			0.017^{***}
			(0.002)
Attention group 3			0.018^{***}
			(0.003)
Attention group 4			0.022^{***}
			(0.004)
Attention group 5			0.030^{***}
			(0.006)
Log(Avg. Holding)		-0.005^{**}	-0.005^{**}
		(0.002)	(0.002)
Controls	No	Yes	Yes
Time FE	Yes	Yes	Yes
Trader FE	Yes	Yes	Yes
Observations	338,653	338,653	338,653
Adj. R^2	0.415	0.533	0.533

$^{***}p < 0.001$, $^{**}p < 0.01$, and $^{*}p < 0.05$.

The table shows the results of the regression on the group of receiving attention with trader and time fixed effects.

Attention group denotes the degree of attention received in that month as follows: *Attention group 0* ($Peerattention = 0$); *Attention group 1* ($Peerattention = 1$); *Attention group 2* ($1 < Peerattention < 5$); *Attention group 3* ($5 \leqslant Peerattention \leqslant 7$) ; *Attention group 4* ($7 < Peerattention \leqslant 20$) ; and *Attention group 5* ($21 \leqslant Peerattention$). *Peer attention* denotes the number of other investors who pay attention to a user in a given period.
The control variables include *Average losing*, *No. of instruments*, *Leverage*, *No. of followed traders*, *Diversification*, *No. of trades*, *Previous SD ROI*, *Previous ROI*, and *Log(Avg. Holding)*.
Average losing denotes the average fraction of losing trades. *Number of instruments* denotes the number of instruments employed each month. *Leverage* stands for the average leverage used for trades; *No. of followed traders* denotes the number of traders who are being followed by the users in a given month. *Diversification* is a dummy variable that takes a value of one if investors invest less than 20% of their budget on the transaction and zero otherwise. *No. of trades* denotes for the number of transactions executed in a given month; *Previous SD ROI* stands for the standard deviation of the return on investment of the previous period; *Previous ROI* denotes the average return on investment of the previous period; and *Log(Avg. Holding)* denotes the logarithm of the average interval between the opening and closing of a position in hours.

Table 1.8: Panel regression analysis

	Holding Period	
	Positive	Negative
	(1)	(2)
Log(1+ Peer Attention)	-0.014^{***}	0.019^{***}
	(0.004)	(0.006)
Controls	Yes	Yes
Time FE	Yes	Yes
Trader FE	Yes	Yes
Observations	306,325	278,332
Adjusted R^2	0.816	0.719

*p<0.1; **p<0.05; ***p<0.01

This table shows the results of the fixed effects regression on the treatment group (investors who receive attention from their peers). *Peer attention* denotes the number of investors who pay attention to a user in a given period.
Positive and *Negative* denote the winning and losing positions of investor i in period t, respectively.
The control variables include *Average losing*, *No. of Instruments*, *Leverage*, *No. of followed users*, *Diversification*, *No. of trades*, *Previous SD ROI*, *Previous ROI*, and *Log(Avg. Holding)* .
Average losing denotes the average fraction of losing trades. *No. of instruments* denotes the number of instruments employed each month. *Leverage* stands for the average leverage used for trades; *No. of followed traders* denotes the number of traders who are being followed by users in a given month. *Diversification* is dummy variable that takes a value of one if investors invest less than 20% of their budget on the transaction and zero otherwise. *No. of trades* denotes the number of transactions executed in a given month; *Previous SD ROI* stands for the standard deviation of the return on investment of the previous period. *Previous ROI* denotes the average return on investment of the previous period. *Log(Avg. Holding)* calculates the logarithm of the average interval between the opening and closing of a position in hours.

Table 1.9: Holding period of the winning and losing positions

	Disposition Effect					
Model	T+1	T+2	T+3	T+1	T+2	T+3
	(1)	(2)	(3)	(4)	(5)	(6)
Log(1+ Peer attention)	0.02***	0.01***	0.01***	0.01***	0.01***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Inexperienced				0.02***	0.03***	0.03***
				(0.00)	(0.00)	(0.00)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Trader FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	283,713	256,070	229,673	283,713	256,070	229,673
Adj. R^2	0.42	0.43	0.43	0.45	0.43	0.43

*p<0.1; **p<0.05; ***p<0.01

This table shows the results of the fixed effects regression on the treatment group (investors who receive attention from their peers). T denotes the treatment time when investors receive attention from their peers for the first time. *Peer attention* denotes the number of investors who pay attention to a user in a given period. *Inexperienced* is a dummy variable that takes a value of one if the investor has below-median experience and zero otherwise.
The control variables include *Average losing*, *No. of instruments*, *Leverage*, *No. of followed users*, *Diversification*, *Log. Holding time*, *No. of trades*, *Previous SD ROI*, and *Previous ROI*.
Average losing denotes the average fraction of losing trades. *No. of instruments* denotes the number of instruments employed each month. *Leverage* stands for the average leverage used for trades; *No. of followed traders* denotes the number of traders who are being followed by users in a given month. *Diversification* is a dummy variable that takes a value of one if investors invest less than 20% of their budget on the transaction and zero otherwise. *No. of trades* denotes the number of transactions executed in a given month; *Previous SD ROI* stands for the standard deviation of the return on investment of the previous period. *Previous ROI* denotes the average return on investment of the previous period. *Log. Holding time* calculates the interval between the opening and closing of a position in hours.

Table 1.10: Evolution of the disposition effect after treatment