Investment Transparency and the Disposition Effect

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Abstract

The disposition effect is lower in a trading environment with salient information on current holdings. Using proprietary data from a European fintech platform for social trading, we analyze variation in trading behavior within and between private and publicly-visible portfolios. The disposition effect diminishes by about 35% when trades and holdings become public. We find the level of transparency and the way financial information is illustrated can influence trading decisions. Our results suggests that requiring greater transparency from portfolio managers can reduce trading bias.

JEL Classification: G11, G41

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Investment Transparency and the Disposition Effect

1. Introduction

In this paper, we examine the impact of information transparency and salience on the behavioral bias known as the disposition effect, that is, the propensity of investors to sell winning positions too soon and keep losing positions too long. We study this in the novel empirical setting of the well-known European social trading platform wikifolio.com. Examining proprietary data from this platform, we show that an increase in the transparency of trades and holdings is associated with a considerably weaker disposition effect, and this result is robust to various alternative explanations. These findings matter because they shed light on a thus far under-researched driver of trading decisions in an otherwise crowded and sometimes contradictory literature. The underexplored factors we focus on are the transparency (i.e., the universal visibility of trades, holdings, and performance to the public) and salience (i.e., vividness) of the information that is being made transparent. This paper is among the first to use empirical evidence to discuss the impact of transparency and salience on trading behavior and investments.

The disposition effect has been extensively studied in the behavioral finance literature. Shefrin and Statman (1985) provide the first conceptual framework to explain it, followed by Odean (1998) who interprets the effect in the context of the prospect theory of Kahneman and Tversky (1979). However, to date, the main drivers of the disposition effect are still being debated, with a range of explanations proposed, including realization preferences (Barberis & Xiong, 2012; Ingersoll & Jin, 2013), cognitive dissonance (Antoniou, Doukas, & Subrahmanyam, 2013; Chang, Solomon, & Westerfield, 2016; Altanar, Guo, & Holmes, 2019; Dierick, Heyman, Inghelbrecht, & Stieperaere, 2019), emotions (Richards, Fenton-O'Creevy, Rutterford, & Kodwani, 2018; Summers & Duxbury, 2012), belief-based trading (Ben-David & Hirshleifer, 2012), and pseudo-rational behavior (Kaustia, 2010; Odean, 1998). We also know that socially inclined investors appear more vulnerable to the disposition effect (Heimer, 2016; Pelster & Hofman, 2018).

Despite these insights, little evidence is directly observed on the trading behavior of investors in the presence of transparency. We examine how an increase in the transparency of current and past trades, combined with a salient display of current holdings, affects the tendency to sell winners too soon and thus contributes to our understanding of the disposition effect. We hypothesize that increases in transparency and in the way current portfolio holdings are displayed motivate traders to reduce the number of losing positions in their portfolio. We argue that this is mainly due to individuals becoming more focused on social esteem and pride, rather than regretting poor choices in the past. In the wikifolio setting, by publishing their portfolio, ideally with winning holdings, to potential followers, traders are likely to feel proud when they can present holdings of gaining shares rather than losing shares.

A wikifolio is a virtual portfolio consisting of several equity positions that individual traders can create and in which other investors can invest. Trading on the wikifolio.com platform takes place in three phases, with increasing levels of transparency in each phase. In the first stage, known as the *test* phase, trade and performance data are hidden and only visible to traders after they decide to publish their portfolios. Then, the portfolio moves to the *published* phase, and both historical trades and current positions become fully transparent and cannot be hidden retrospectively unless the trading account is deleted from the platform.[1] The portfolio overview in this phase therefore also includes previously invisible trades that were executed in the test phase. The value of portfolio holdings is refreshed every few seconds, with the performance of current holdings (i.e., paper gains and losses) prominently displayed. Each position is marked in red if it is in the loss region, and green if it is in the gain region.

The trader's awareness of potential observers, that is, outside attention paid to the portfolio, is further increased in the third and final phase, known as the *investable* phase. To progress to this phase, at least 10 investors have to declare their investment interest in the portfolio. Then and only then will the portfolio manager become eligible to attract funds (i.e., real money) from external

[1] A consequence of all historical trades being unhidden is that, from day one, traders know they have to take their transactions seriously if they aspire to progress in the platform, since all their trades and holdings will eventually become visible to their investors and, indeed, the public.

investors. This empirical setting, particularly the segmentation of portfolio stages, allows us to analyze how differences in transparency influence trading behavior.

Our findings contribute to the growing literature on social trading platforms (e.g., Heimer, 2016; Pelster & Hofman, 2018; Kromidha & Li, 2019) by examining the role of transparency and salience in these settings, an important but largely overlooked factor in trading decisions. In addition, our results contribute to work on self-auditing in a transparent environment (e.g., Power, 1999) by showing that individuals make more cautious financial decisions once they know they could be observed by others. Our findings also contribute to wider discussions around the impact of financial technology on financial decision making. We present evidence suggesting that the way financial information is framed can positively affect investment decisions, which adds to ongoing debates around risk taking and investment bias in the areas of robo-advising (D'Acunto, Prabhala, & Rossi, 2019) and copy trading (e.g., Apesteguia, Oechssler, & Weidenholzer, 2020). We also contribute to the literature on salience (e.g., Bazley, Cronqvist, & Mormann, 2021; Frydman & Wang, 2020) and framing (e.g., Liêu & Pelster, 2020), by showing that the way financial platforms display trading data can directly influence investments. Our findings also contribute to the current debate on the relevance of reference points in relation to the disposition effect (e.g., Brettschneider, Burro, & Henderson 2021). We further contribute to Heimer (2016), who finds the disposition effect of traders joining a foreign exchange (forex) social trading platform increases. Different from Heimer (2016), we examine equity trading behavior *within* the platform and show that a reduction in the disposition effect is possible when current portfolio holdings become transparent to investors.

Finally, our findings also contribute to the window dressing literature (e.g., Lakonishok, Shleifer, Thaler, & Vishny, 1991; Sias & Starks, 1997; He, Ng, & Wang, 2004; Ng & Wang, 2004; Agarwal, Gay, & Ling, 2014). We show that, once fund managers are faced with transparency, they engage in more active buying and selling behavior and start clearing out their losing positions, thus weakening the disposition effect. However, we also find step changes in the disposition effect as portfolios become more transparent that cannot be completely explained by window dressing. We argue this result more likely is due to fund managers' increased attention to their holdings after entering a new phase.

The structure of the trading platform in our study, which highlights current portfolio holdings in different colors (red and green), plays a key role in the findings. To improve the impression of their portfolios, fund managers are motivated to cut the number of losing positions quickly to make them less salient. Specifically, we find that, when traders move from the test phase to the published and investable phases, they start to sell more losing positions compared to winning positions as their holdings become public, thus reducing the disposition effect.

These findings also have important policy implications. Conventional fund managers typically file their disclosures on a quarterly basis. There is a policy trade-off between demanding transparency to protect investors and reducing transparency to discourage free riders who imitate portfolio decisions (Holmes, Kallinterakis, & Ferreira, 2013; Villatoro, 2009). On balance, we argue that increasing the frequency and volume of reporting to monthly or bimonthly can have positive implications for investors. The evidence (e.g., Heisler, 1994; Odean, 1998; Barber & Odean, 2000; Barber, Liu, & Odean, 2007; Kaustia, 2010; Seru, Shumway, & Stoffman, 2010) on the negative wealth impact of the disposition effect implies that the transparent display of financial performance could positively contribute to investor returns.

2. Theoretical framework

The disposition effect has been closely scrutinized in the behavioral finance literature. Shefrin and Statman (1985) argue that the disposition effect is predominantly due to emotion-laden factors, including pride in realizing gains and regret in realizing losses. Applying the S-shaped valuation function developed by Kahneman and Tversky (1979), Shefrin and Statman (1985) show that traders are risk seeking (averse) when their shares are trading lower (higher) than their reference price, usually trading at a loss (gain) compared to the original purchase or the average purchase price. To avoid regret through closing a losing position, traders become inactive in terms of their losing positions. To circumvent this inactivity, Shefrin and Statman (1985) argue that professional traders

implement heuristics such as fixed stop losses to ensure that they are closing positions,[2] while data from amateur investors (e.g., Odean, 1998) suggest that these individuals are less likely to close losing positions.

A common explanation for the disposition effect is mental accounting, which explains why traders do not consider their overall wealth or financial holdings a unified whole, but segregated accounts. Traders create reference points for each position, with common reference points being the share purchase price or its highest value during the holding period. These reference points form the basis for the evaluation of all subsequent changes in price (Tversky & Kahneman, 1981; Thaler, 1985, 2008). Generally, when investors sell a losing stock, they close the associated mental account at a loss. More recent evidence (e.g., Riley, Summers, & Duxbury, 2020) highlights the dynamic nature of these reference points and how they are updated as new information arrives.

To theoretically motivate our hypotheses, we draw on a number of commonly accepted explanations for the disposition effect. On the one hand, we know that cognitive dissonance (Festinger, 1957) can help explain the disposition effect (Chang et al., 2016). In other words, keeping paper losses seems to result in less cognitive unease or dissonance than realizing those losses. On the other hand, the way financial information is displayed can influence buying and selling decisions. For example, stock visibility and reference prices can lead individuals to purchase even more losing stocks (Frydman & Rangel, 2014; Leal, Loureiro, & Armada, 2018; Frydman & Wang, 2020; Liêu & Pelster, 2020). Similarly, the use of different colors, particularly red, can influence financial decision making (Gnambs, Appel, & Oeberst, 2015; Bazley et al., 2021). For example, Bazley et al. (2021) find that, when losses are presented in red, investors take on less risk and are more pessimistic about future outcomes. The authors show that higher levels of saliency trigger a "bottom-up" increase in attention. These findings suggest that two factors could be increasing the activity of portfolio managers in our setting: first, a highly salient representation of current holdings and their relative gains/losses compared to the average purchase price and, second, the mandatory transparency of having to present all positions in the published phase.

[2] Recent evidence by Dong and Doukas (2020) suggests that highly skilled portfolio managers are able to identify mispriced stocks, especially in high-sentiment periods (Dong & Doukas, 2018).

Shefrin and Statman (1985, pp. 781–782) state that "[t]he quest for pride, and the avoidance of regret lead to a disposition to realize gains and defer losses." Strahilevitz, Odean, and Barber (2011) and Barber and Odean (2013) argue that investors experience regret when they repurchase a formerly sold stock at a higher price and pride (rejoicing) when they repurchase it at a lower price. However, in our setting, pride is likely to result not only from realizing gains, but also from the performance of the portfolio presented to potential investors. We argue that this is because of the very salient presentation of performance and because the goal of wikifolio managers is to attract followers and to present their portfolio in the best possible way. Building on Adam Smith (1790) who suggested that individuals are endowed "with an original desire to please, and an original aversion to offend his brethren", Ellingsen and Johannesson (2008) argue that social recognition is a source of pro-social behavior, which motivates individuals' performance.

In relation to this, Schniter, Shields, and Sznycer (2020) argue that pride promotes the "social value of the individual in the minds of others" (p. 3). Importantly for our context, they argue that pride motivates acts that, if discovered by others, increases the welfare of those observers or followers. With respect to the disposition effect, this would suggest that, to increase the welfare (i.e., investment returns) of followers, losing stocks should be sold and winning stock kept. Generally, the literature on the well-documented Hawthorne effect (for a review, see McCambridge, Witton, & Elbourne, 2014) shows that individual decision making is influenced by knowing that one is being observed or surveyed (e.g., Crossley et al., 2017; Zwane et al., 2011), even if interactions take place in an anonymous setting, such as the one we observe (Dana, Cain & Dawes, 2006). This result suggests that individuals who are likely to be observed (i.e., trade in the published phase), are prone to feeling pride in demonstrating a well-managed portfolio.

In the context of social trading, Kromidha and Li (2019) and Wohlgemuth, Berger, and Wenzel (2016) identify certain trading characteristics that signal leadership and trustworthiness to potential investors (followers). Pelster and Breitmayer (2019), for example, find that traders on social trading platforms who attract attention from their peers increase their activity and risk taking behavior. We can therefore assume that portfolio managers behave differently on a social trading platform when they are trying to accumulate followers and investments.

This argument suggests that, in the wikifolio setting, we should expect to observe higher levels of activity and higher numbers of loss realizations around phase changes, when the level of transparency and attention increase. Drawing on Shefrin and Statman's (1985) description of pride seeking, we argue that portfolio managers are more likely to be seeking to present positive results, that is, holding winning shares rather than losing shares, even if this means realizing losses. Hence, portfolio managers who are regret averse might want to forgo loss realization in a private environment (here, the test phase) and therefore show high levels of the disposition effect during this phase. Once they transition to the published phase and trade in a transparent environment, they may want to "show off" their portfolio and are therefore more likely to seek pride by presenting their winning shares and selling their losing shares, thereby reducing their disposition effect. Shefrin (2007) suggests that a person who is regret averse will be likely to make decisions that reduce pain and that self-control mechanisms could support individuals in making better long-term decisions. In the case of the wikifolio, besides standard tools such as stop loss strategies, a phase change is likely to trigger a portfolio manager's attention to current positions and lead to an increase in loss realizations.

Importantly, social effects can influence information processing and motivate behavioral change (for a comprehensive analysis of current evidence, see Hirshleifer, 2020). In the context of social trading platforms, Pelster and Hofman (2018) find that users who have followers tend to have a higher disposition effect than users without followers. Liu, Nacher, Ochiai, Martino, & Altshuler (2014) present similar evidence for the users of eToro, an alternative social trading platform focusing on forex. Similarly, investigating the behavior of traders on a forex social trading platform, Heimer (2016) finds that their tendency to realize gains increases once they join the platform. However, trading in foreign currencies differs significantly from trading in equity.[3]

Hermann, Musshoff, and Rau (2019) use an experimental setting to show that the disposition effect is stronger once traders perform trades on behalf of others. Fund managers tend to alter their

[3] For example, O'Connell and Teo (2009) find that institutions trading with forex rates tend to close their positions much more quickly if they are in the loss region. Locke and Mann (2005) furthermore argue that the trading speed and the magnitude of each position are very different. Currency traders tend to only trade currency pairs and typically hold them for short periods, compared to equity traders, who typically hold positions for longer periods. Similar differences in the disposition effect have been noted for equity compared to fixed income (Hincapié-Salazar & Agudelo, 2019).

portfolio holdings in stocks that have done well or poorly if they have to publish their holdings to others, often referred to as window dressing (e.g., Lakonishok et al., 1991; Sias & Starks, 1997; He et al., 2004; Agarwal et al., 2014). Agarwal et al. (2014) find that managers engaging in window dressing are prone to excessive turnover. In a social trading context, individuals trade with the goal of attracting followers and accumulating the funds of others, once this possibility arises (i.e., in the investable phase). Becoming aware of being observed could help improve one's self-auditing (Power, 1999) and thereby reduce the disposition effect. Shefrin and Statman (1985) argue that traders become inactive in terms of losing positions. Changing into a new phase of trading in our setting, combined with the increase in potential observers, could increase activity and cause traders to start reevaluating their current positions. Therefore, we must take note of 1) the structure of the platform 2) the way current holdings are presented and 3) the asset classes being traded.

Importantly, the level of transparency of trades and holdings increases as traders move from the *test* to the *published* phase and then to the *investable* phase. Because of the color coding used throughout the platform, current loss positions flash in a high-saturation red and gain positions in a low-saturation green every 10 seconds, reinforcing the salience of gains versus losses for the portfolio manager and for all the portfolio's followers. Therefore, we present our core hypothesis as follows.

> *H_1: An increase in the transparency of portfolios moving from the test to the published phase is associated with a reduction in the number of losing positions held and, thereby, a reduction in the disposition effect.*

We expect to see a similar pattern, though perhaps a smaller effect, when portfolios are upgraded to the *investable* phase. A precondition for this upgrade is at least 10 investors declaring their interest in a given portfolio. Thus, while the level of transparency between the *published* and *investable* phases does not change much, *investable* portfolios attract more attention and are featured in *wikifolio.com* more prominently, in a category of their own. Hence, we propose the following hypothesis.

H_2: An increase in the prominence of portfolios moving from the published to the investable phase is associated with a reduction in the number of losing positions held and, thereby, a reduction in the disposition effect.

In the remainder of the paper, we test these hypotheses, as well as alternative explanations relating to survivorship bias, learning, and assets under management as follows: Section 3 introduces the empirical setting, data, and methods. Section 4 presents the results. Section 5 discusses the results in the context of the literature. Section 6 concludes the paper by highlighting its main contributions.

3. Data and empirical approach

3.1 Data

There were around 25 social trading platforms in existence in 2018 (Gemayel & Preda, 2018) and the number has grown considerably since then. Social trading platforms allow traders to observe all other traders, their performance, holdings, and related investment details. While their underlying processes are similar, most platforms, such as eToro and ZuluTrade—self-reported market leaders—focus on contract for differences trading on forex, commodities, or indices. Traders can start trading their own funds or create a virtual portfolio, with their compensation based on a combination of factors, such as assets under management, numbers of followers, and portfolio performance.

Our study uses data from wikifolio.com, a social trading platform established in 2012. A wikifolio is a virtual portfolio consisting of several equity positions that individual traders can create and in which other investors can invest. In this setting, the equity positions are not bought and sold in the stock market, but virtually, on the platform. The managed portfolio, however, is traded on the exchange, similar to an exchange traded fund. The fee structure and other incentives of wikifolio managers are very similar to those of typical fund managers. The managers' aim is to attract funding from other users by showing a track record of successful portfolio management.[4]

[4] Although wikifolio manager is the formal term used and preferred by the platform, for simplicity and ease of reference, we use the term fund manager in the rest of the paper. We acknowledge differences between conventional fund managers and this platform's wikifolio managers. For example, while the former manage

We acquired the wikifolio.com's full dataset, including the trading and holding data of 10,604 wikifolios trading 2,974 different stocks up until May 2016. Our sample excludes around 5,000 portfolios managing exchange traded funds, options, and other synthetic products. To reduce noise, we also exclude wikifolios that executed fewer than 10 trades since their inception. To understand potential survivorship bias, we analyze the differences between traders who achieve investable portfolios and those who do not. Further, we compare money-managing portfolios, that is, those that have accumulated funds, with those that have no assets under management.

Figure 1 illustrates the different phases a wikifolio goes through to become investable for other users. The first phase is the *test* phase, where a user can trade without being observed by the public. The user can then decide whether to publish or delete the test portfolio. Once *published*, the portfolio cannot be deleted (except if the user deletes his or her account), and all the user's current holdings and past trades become visible, including all trades in the test phase of the respective portfolio that were hidden before. However, if a user decides to delete a test portfolio and start a new one, other users will not be able to retrieve the deleted information. Our proprietary dataset, however, includes portfolios that have been deleted, giving us the opportunity to analyze the behavior of non-survivors. Importantly, a user can have only one test portfolio, but several published or investable portfolios.

Before a portfolio becomes *investable*, certain quality criteria must be met. These include the expression of interest from at least 10 other traders, a minimum period of 30 days spent in the published phase, a telephone interview conducted with the platform, and the provision of a suitable identity document ensuring that no individual can open more than one account. Once these criteria are satisfied, the portfolio becomes investable, and an equivalent certificate is created on the stock exchange. The certificate's value depends directly on the performance of its associated portfolio. A 1% increase in the portfolio's value corresponds to a 1% increase in the respective certificate price on the stock exchange.

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funds as a professional activity, the latter can be less sophisticated individuals investing as a side activity. In addition, the former are subject to the intricate institutional setting of investment houses, whereas the latter are not.

Insert Figure 1 around here

Managers of wikifolios are motivated to perform similarly to other investment managers, with reimbursement depending on performance and assets under management. The managers self-select a performance fee that can range from 5% to 20%. This fee is based on the high-water mark principle, and the proportion they receive depends on assets under management. Portfolios with more than €125,000 in assets under management receive 50% of the performance fee, with the rest going to the platform. This water mark is reset at the end of December to match the index level of the respective portfolio on that day.

As can be seen in Table 1, the portfolios have produced an annualized mean return of almost 13% per year. The portfolios are quite young, the oldest being around four years old, with a median of 1.7 years. Money-managing portfolios are slightly older, with a median of 2.1 years. The average amount of assets under management among the money-managing portfolios is €66,720, with the largest managing more than €11.6 million. The median amount of assets under management is €5,450, suggesting that only few traders have been able to accumulate significant funds, and the income to most fund managers from their trading activity is relatively low.

Our sample includes more than 2.2 million transactions: 1,368,107 buy and 849,889 sell trades. On average, each money-managing trader in our sample realizes 83 gains (with a median of 30 gains) and 50 losses (with a median of 17 losses). Compared to other social trading platforms that focus on forex, the average number of trades on wikifolio.com is lower, which is an attribute of equity trading, where holding periods tend to be longer. While most wikifolio.com users are from German-speaking countries, the selection of stocks is globally diversified, with US firms being popular. The traders in our sample invested in 882 unique stocks, with Apple being the most popular and featuring in 4,074 portfolios, suggesting that some portfolio managers could be engaging in herding (Walter and Moritz Weber, 2006).

Figure 2 illustrates the interface visible to traders and other users, and Figure 3 shows the typical portfolio overview, displaying the last 10 trades per page. While the full trading history and the percentage of gains or losses on completed trades are reported (as illustrated in Figure 3), it is

noteworthy that the main portfolio overview focuses on current holdings and whether the various shares held are currently at a gain (in green) or at a loss (in red) relative to their average purchase price. This is a key difference from other social trading platforms, such as eToro, which focus on the ratio of profitable trades.

3.2 Empirical approach

Fundamentally, we aim to compare trading behaviors—the disposition effect, in particular—in different phases, each characterized by an increasing level of transparency. We build on Heimer's (2016) work, who expands on the work of Kaustia (2010), Linnainmaa (2010) and Grinblatt, Keloharju, and Linnainmaa (2012), by comparing trading behaviors before and after joining a social trading platform. We adjust Heimer's approach by testing the impact of changing status on the disposition effect, using the following model:

$$sale_{ijt} = \beta_1 gain_{ijt} + \beta_2 post\text{-}test_{ijt} + \beta_3 gain_{ijt} * post\text{-}test_{ijt} + \varepsilon_{it} \quad (1)$$

The dummy variable *sale* takes a value of one when stock *i* is sold by trader *j* on day *t*, where *t* is any day on which a sale transaction takes place. For example, if a fund manager has 10 stocks in a portfolio and sells two of them on day *t*, we would observe 10 decisions; in two cases the sale dummy would be equal to one, and in eight cases it would be equal to zero. This also means, while we observe buy transactions in the data, we only use days on which a sale transaction takes place. The *gain* variable takes a value of one if the stock has appreciated compared to its average purchase price, and zero otherwise. Thus, a positive and significant value for β_1 indicates the presence of a disposition effect, showing that traders have a higher propensity to sell shares that have appreciated in value than those which have depreciated in value. Table 2 describes all additional variables.

To capture the impact of the change from managing a private portfolio (during the test phase) to managing a portfolio that is visible to all users, we introduce the dummy variable *post-test*, which

takes the value one for portfolios that are in either the published or the investable phase and are thus transparent to every other user, and zero otherwise. This difference-in-differences (DID) test, therefore, examines the impact of trading in public compared to trading in an anonymous environment.

Next, we explore whether behavior depends on the level of transparency. To this end, we analyze the dummies for the *published* and *investable* phases, as well as their interactions with the gain variable, with the test phase being the baseline. To control for attention, the model includes time series data for the assets under management (*AUM*) for each portfolio interacted with the gain dummy variable:

$$\begin{aligned} sale_{ijt} = {} & \beta_1 gain_{ijt} + \beta_2 published_{ijt} + \beta_3 gain_{ijt} * published_{ijt} + \beta_4 investable_{ijt} \\ & + \beta_5 gain_{ijt} * investable_{ijt} + \beta_6 AUM_{ijt} + \beta_7 gain_{ijt} * AUM_{ijt} + wX + \varepsilon_{it} \end{aligned} \quad (2)$$

Our main analysis includes trader, week-of-the-year, and year fixed effects and clusters standard errors at the trader and week levels. We conduct robustness tests, controlling for the impact of gaining experience through having previously run a wikifolio. Controls for learning effects help address our main research question, by showing that change in behavior is the result of the phase change and the associated increase in transparency, rather than greater investment experience.

Following the disposition effect literature (e.g., Grinblatt & Keloharju, 2001; Hur, Pritamani, & Sharma, 2010; Birru, 2015; Chang et al., 2016), we also control for market returns using index returns with different time horizons (Birru, 2015). The results are robust to the inclusion of additional controls for portfolio-specific measures, such as the portfolio return, Sharpe ratio, number of trades, and number of holdings at the time of sales.

4. Empirical results

4.1 Core findings

In our model, the main variable of interest is the gain dummy and its interaction with other variables. This variable takes the value of one for each stock if the market price exceeds its average purchase price. The dependent variable in the main analysis is a dummy taking the value of one if the position is sold. We include trader fixed effects to control for heterogeneity in trader characteristics, which could affect their susceptibility to the disposition effect, as well as week and year fixed effects, to control for potential time effects. Standard errors are clustered by trader and week.

As can be seen in Table 3, we perform the first specification of Eq. (1) to compare the magnitudes of the disposition effect without controlling for other factors, except for trader and time fixed effects. The second, third, and fourth specifications consider only observations in the test, published, and investable phases, respectively. The fifth specification introduces a dummy variable for the transition from the test phase to the portfolio becoming visible (Eq. (1)), while the sixth specification explores whether behavior changes with the degree of transparency (Eq. (2)), separating out the transparent period into the published and investable phases.

A positive and significant loading on the *gain* variable indicates that portfolio managers are more inclined to sell winners than losers, hence the presence of a disposition effect. In column (1) of Table 3, we find a value of 8.45% for the coefficient on the *gain* variable. This value is higher but comparable to the 3.9% of Chang et al. (2016). This result indicates that wikifolio users are, on average, more subject to the disposition effect than equity traders in a traditional environment, consistent with Heimer's (2016) findings for currency traders. Importantly, however, the results for the second, third, and fourth specifications show a monotonic decline in the disposition effect, as traders move from the test to the published phase and onto the investable phase. The *gain* variable is about 35% smaller in the investable phase than in the test phase. We show trading behavior changes when a portfolio becomes transparent, as well as with increasing transparency throughout the portfolio life cycle. In other words, this finding suggests that transparency could mediate the disposition effect. The DID test in column (5) shows a significant reduction in the disposition effect as

the portfolio becomes transparent, with a coefficient of -2.89% for the interaction term (*Gain*Post-Test*). As transparency increases, with the portfolio moving from the *published* to the *investable* phase, the disposition effect is further reduced (column (6)). These robust results show the changes in the selling behavior of traders between the three phases.

To test if our core results are influenced by outliers, we exclude the upper and lower deciles for the variables capturing *AUM*, the *number of holdings*, the *number of trades*, and *portfolio returns.* We find that the coefficient for the key DID variable interaction (*Gain*Post-Test*) remains negative and significant, as in previous tests. The effect becomes even stronger when we exclude *AUM* outliers (i.e., very small and very large portfolios). Combining all exclusion rules in column (6) shows a similar effect, since, in this case, the coefficient is even larger than for the other specifications, including the baseline results. This result suggests that the findings are robust to outliers. Table 4 shows the results for this analysis. The subsequent tests include all observations.

Next, we explore whether the change in behavior is related to the realization of losses or gains, or whether both are equally important. Figure 4 shows the average number of gains and losses realized per day around phase changes, focusing on the 10 days before and after a phase change. The results suggest that individuals reduce the realization of gains after phase shifts, in favor of loss realization. The effect seems to take place just after a trader moves from the *test* to the *published* phase, but also when the trader moves from the *published* to the *investable* phase. The results in Figure 4 suggest that the magnitude of realized gains and losses increases over time and between the phases. The graphs support the intuition that, just after a phase shift, individuals seem to increase their loss realization behavior. In other words, they appear to "clean out" losing positions just after changing phases. This effect appears to be especially strong for the change from the *published* to the *investable* phase.

These findings are somewhat surprising. Since traders are able to decide themselves when to change from the test to the published phase, we would have expected them to clean their portfolios

before, and not after, the transition from one phase to another. The same is true for the change from the published to the investable phase. While traders need to qualify for a change, for example, by having at least 10 other traders interested in their portfolio, they can still themselves decide to stay in the published phase or move to the investable phase. However, as Shefrin and Statman (1985) argue, traders become inactive when faced with losing positions, and a phase change increases their attention to their own portfolios.

To further explore the different behaviors between phases, the influence of transparency, and the way information is illustrated to the portfolio manager, as well as to potential followers (i.e., salience of financial information), in the next sections, we test several possible alternative explanations, such as survivorship, learning, and the amount of assets under management.

4.2 Survivorship bias

One potential concern relating to our findings so far is that only those portfolio managers who perform well can move through to the published and investable phases. To address this potential survivorship bias, we perform additional tests for portfolios that are not and will not be published and/or investable. By grouping each portfolio based on its final stage, we can observe differences in behavior between portfolios that proceed to later phases and those that do not. For example, we compare the coefficient on the gain variable in the test phase of those portfolios that eventually become investable against those which will not move through the complete life cycle. Table 5 summarizes these results and compares them to the baseline findings in Table 3. We find little evidence to suggest that the test portfolios closed by traders who do not progress beyond the test phase suffer from a greater disposition effect than the test portfolios of other traders. This result suggests that survivorship bias does not drive our results. The next section provides additional tests exploring the impacts of learning effects and assets under management.

4.3 Learning

In principle, learning can reduce the disposition effect (e.g., Vaarmets, Liivamagi, & Talpsepp, 2019). However, by conducting additional tests focusing on the tenure of portfolio managers, we show that learning does not drive our results. To control for potential learning effects, we explore differences between traders' first (i.e., earliest formed) portfolios and, for those with more than one portfolio, their last (i.e., latest formed). About half the traders manage more than one portfolio on the platform. As before, we use two different model specifications: one with a DID setting, including a *post-test* dummy to capture the impact of portfolios moving from the test phase to becoming visible, and the second specification with separate dummy variables for published and investable phases. The results are reported in Table 6.

The findings suggest that traders do not show considerable evidence of learning—as far as the disposition effect is concerned—within a phase, with their behavior in their most recent portfolios being very similar to that observed in their first portfolio. We find no reduction in the general level of the disposition effect from their first to last portfolio. However, for both their first and last portfolios, the disposition effect is significantly reduced as the portfolio moves out of test phase and becomes transparent. Again, the coefficients are similar for traders' first and last portfolios, suggesting limited learning.

Another potential explanation we examine is whether users improve their trading style during a given phase and thus exhibit a lower disposition effect in the subsequent phases. To address this, the next test compares individuals' trading behaviors just before and after moving to a new phase. We analyze the last 10 trading days before a phase change and the first 10 trading days following a phase change.

Table 7 reports the results of this test. As indicated in Figure 4, we find increased trading activity shortly after changing from the test to the published phase. However, the results suggest that, once traders are in the new phase, they begin realizing more losses than before, while holding on to gains. The coefficient on the *gain* variable changes significantly between the last 10 days within the test phase and the first 10 days in the published phase ($t = 2.639$, $p = 0.0083$). However, the

coefficients in the first and last 10 days within the published phase are not statistically different from each other ($t = 0.532$, $p = 0.5947$). The first 10 days in the investable phase, then, again show a significantly lower disposition effect than during the last 10 days of the published phase ($t = 7.549$, $p < 0.0001$). This result suggests that, while traders do not appear to learn significantly within a given phase, they react quickly following a phase change, with the disposition effect diminishing as their transactions and holdings become more transparent.

Insert Table 7 around here

4.4 Window dressing

The previous results suggest that traders are reacting to an increase in transparency by reducing the number of losing positions in their portfolios. Portfolio managers appear to repeat this cleaning process to an even larger extent once their portfolio becomes investable. These findings link back to the window dressing literature (e.g., Agrawal et al., 2014) and suggest that, once the level of transparency is increased, fund managers start to clean out their portfolios and thereby reduce the disposition effect. Figure 5 below provides further insights into this behavior. It shows the average turnover ratios (Agrawal et al., 2014) in the months leading up to and after a phase change. We find the turnover ratio increases in the months leading up to a change from the test to the published phase (blue dots), and similarly from the published to the investable phase (red dots). When considering the change from the test to the published phase, we observe the turnover ratio drops in the first month of the published phase. Afterward, for both phase changes and both groups of portfolio managers, we find a steady decline in the turnover ratio over time.

In terms of overall turnover as a measure of activity, we find that activity is usually higher in the month before and after a phase change. These results, combined with the analysis and the regression analysis above, suggest that portfolio managers actively change their trading behavior around phase changes. Specifically, they start to sell more losing positions than they did before a phase change, thereby reducing the disposition effect.

4.5 Assets under management

A possible concern regarding changes in the disposition effect between phases is the fact that some users are successful at accumulating funds, while others do not attract the necessary attention and investments. The availability of *AUM* time series data allows us to proxy for a portfolio's number of followers, that is, the level of attention it receives. We argue that the larger the assets managed in a portfolio, the more followers the portfolio is likely to have, and, thus, the more attention it receives. Thus, the portfolio manager could feel greater responsibility managing another person's money (e.g., Hermann et al., 2019).

The regression results in Tables 8 and 9 show that *AUM* has a statistically significant impact on a portfolio manager's behavior. The interaction coefficient between the *gain* dummy and *AUM* is negative and significant. This result suggests that individuals with higher *AUM* values, that is, who receive more attention—particularly in the context of wikifolio.com, which highlights gains and losses on current holdings—are less inclined to keep losing positions in their portfolio. Controlling for this, however, does not change the significant and negative sign of the *phase* dummy, thus supporting our argument that transparency and the way holdings are displayed drive the reduction of the disposition effect. To further control for the impact of assets under management, both tables illustrate the differences in behavior between investable portfolios with and without *AUM*. The results suggest that the impact of transparency is stable and that the disposition effect is reduced in both settings.

5. Discussion

We have examined a major social trading platform and shown that the level of the disposition effect falls considerably as portfolios go from the first phase (*test*) to the second phase (*published*), and then to the third phase (*investable*). Tracking the coefficient on the *gain* variable in our baseline regression (Table 3), we find the reduction in the disposition effect from the test to the published phase is 13%, and that from the published to the investable phase 27%, with the total reduction amounting to 35%.

While we find that the level of assets under management moderates the disposition effect, it cannot fully explain the change in behaviors between phases. Therefore, we conclude that factors specific to the second and third phases of the portfolio life cycle are associated with the decline in the

disposition effect. In particular, we argue that the increased transparency as portfolios move through the subsequent stages and the salient impacts of current holdings becoming visible and the color coding depending on losses or gains are the main factors associated with the reduction of the disposition effect. Portfolio managers appear to become more active in selling their positions after a phase change, especially loss positions.

At first glance, our core results might seem to contradict those of Heimer (2016) and Pelster and Hofman (2018), who study other social trading platforms and show that the disposition effect increases as individuals join social trading platforms. However, similar to these studies, we find high levels of the disposition effect among the users of social trading platforms. Importantly, we argue that our results are driven by differences in the assets traded, the salience of the trading information displayed, and the time horizon of the trades. In particular, on wikifolio.com, paper gains and losses are more salient than realized gains and losses, while, on other social trading platforms, such as eToro (see Figure 6), it is the proportion of realized gains and losses that is more salient. The cognitive discomfort of having one's losing positions in the public domain is potentially magnified by the way wikifolio.com presents current holdings and past trades. The value of holdings is refreshed every 10 seconds, and each position is in red if it is currently in the loss region, and green if in the gain region (Bazley et al., 2021). Thus, the current relative position of each holding is highly salient to observers and to the portfolio managers themselves.

Hence, to improve the impression of one's portfolio, the manager could be motivated to cut the number of losing positions swiftly, to make them less salient, which can, in turn, lower the disposition effect. Empirical evidence shows that fund managers engage in window dressing to attract potential investors. Positive performance, particularly realized gains, increases the communication activity of investors (Han et al., 2018). However, in the wikifolio.com setting, it is only possible to provide written commentary on one's own trades, and not the trades of others.[5] Therefore, the main channel for communicating success stories is the actual portfolio dashboard. As such, improving the

[5] See Anderson and Larkin (2019) for a discussion of the impact of informative and non-informative text on investor behavior.

trader's image could involve reducing red positions, to present successful decisions to potential followers. Although it is still possible to see the trading history of each portfolio and identify losing trades, the effort to find these is increased, and hence poor performance is made less visible (see Figure 3).

This salient illustration of shares' performance combined with changes in the level of transparency seems to support portfolio managers in increasing their self-control, reducing their regret aversion (e.g., Shefrin & Statman, 1985). What happens around phase changes appears to be an effortful reevaluation of current positions, that is, System 2 thinking (Kahneman, 2011). This is in line with the findings of Richards et al. (2018), who show strategies that involve regulating emotions help to improve System 2 thinking and thereby reduce susceptibility to the disposition effect. The phased structure and the way holdings are illustrated appear to affect portfolio managers' emotional responses. Our results suggest that trading in a new phase "activates" portfolio managers who were inactive in terms of their loss positions before a phase change. This is likely linked to the overall goal of trading on a social trading platform, showing off superior trading skills, or attracting external investments to increase personal income. With either goal, it appears that portfolio managers would benefit from cleaning out their portfolio of negative holdings and thereby, reduce the disposition effect.

Under a broader view, while there is little evidence concerning the impact of transparency in the finance literature, qualitative work in sociology can be usefully drawn upon. Most prominently, Foucault (1979) refers to the concept of the panopticon as a means of producing "a state of conscious and permanent visibility that assures the automatic functioning of power" (Bentham, 1843, p. 196). The panopticon concept has been used in prison architecture to allow wardens to observe inmates from a central tower. Hence, inmates know the possibility of being observed exists at all times, without actually knowing whether the warden is watching them at any given moment. By extension, the panopticon-structured society, in our case a social trading platform, is an institution that fulfills similar observational and recording functions. The centrality and anonymity of the observer allow for the diverse observer characteristics. Hence, an observer can be a prison guard, a website visitor, or the financial regulator; the observed would be unable to distinguish between them. Similar to Foucault,

Power (1999) suggests that modern society uses self-auditing as a means of control. In our setting, society members (portfolio managers) are aware that society (all platform users) can always observe them. This power of perceived control of the investors seems to result in self-governance and the mitigation of cognitive biases, resulting in a reduction in the disposition effect.

6. Conclusion

This study contributes to the finance literature by showing that changes in the level of transparency are associated with significant changes in trading behavior, as illustrated by changes in the disposition effect. Using trading data from thousands of portfolio managers in a transparent social trading environment, we demonstrate that individuals display a lower disposition effect once their portfolios become visible to others.

Our findings suggest that the reduction in the disposition effect is mainly due to the impact of transparency and the salience of financial performance. Transparency is associated with self-governance in a social environment. The structure of the wikifolio.com platform, which highlights current holdings, likely heightens the cognitive discomfort from having to publicly display negative portfolio holdings. We find greater loss realization and a lower disposition effect once holdings become visible and prominently displayed to the public. The results suggest that loss realization, key to reducing the disposition effect, is reinforced via two channels: firstly, through the way portfolio holdings are displayed in different colors based on past performance and, second, through the more prominent display of current gains and losses, which focuses on current holdings rather than realized gains and losses. These two channels both encourage loss realization and therefore reduce the disposition effect.

These empirical findings have important implications for theory and practice. We show how the level of transparency and the way financial information is illustrated can mitigate the disposition effect. The way information is displayed, both to the fund manager and to followers, is directly linked to loss realization and thereby to a reduction in the disposition effect. Thus, our findings contribute to the recent literature on salience (e.g., Bazley et al., 2021; Frydman & Wang, 2020) and framing (e.g.,

Liêu & Pelster, 2020). Since the disposition effect is universally found to be wealth diminishing (e.g., Barber & Odean, 2000; Singal & Xu, 2011), applying these insights in practice can help improve the performance of investment managers, trading platforms and associated businesses (D'Acunto et al., 2019; Apesteguia et al., 2020; Schniter et al., 2020).

Our analysis of behavior around phase changes also contributes to the literature on window dressing (e.g., Lakonishok et al., 1991; Sias & Starks, 1997; He et al, 2004; Ng & Wang, 2004; Agarwal et al., 2014) by providing a new perspective on the motivation and triggers of window dressing behavior. The findings presented on such behavior also inform policy makers. Specifically, we posit that increasing the frequency and volume of reporting by fund managers to monthly or bimonthly can have positive implications for their investors. At the same time, we acknowledge that the very frequent reporting of portfolio holdings, probably more than bimonthly, could be impractical and costly for conventional fund managers and lead to the emergence of copycat funds (Verbeek & Wang, 2013). Therefore, future research could explore optimal thresholds for the reporting volume and frequency of financial disclosures in the fund management sector.

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Table 1. Summary statistics

This table provides descriptive statistics for assets under management, the numbers of buy and sell trades, the annualized returns of portfolios in absolute terms, the numbers of realized gains and losses, and the average time the portfolios spent in each of the three phases. Annualized portfolio returns are winsorized at the 95% level. Panel A considers all traders, and Panel B considers portfolios that have accumulated assets.

	Mean	Std.Dev	Median	Min	Max	N
Panel A: All wikifolios						
Assets under management (000's of €)	11.63	190.79	0	0	11,604.84	10,604
Number of trades	149.69	356.68	53	10	10,126.00	10,604
Annualized portfolio return (%)	12.83	27.62	5.08	-28.98	92.19	10,604
Number of realized gains	37.95	94.81	11	0	1,934.00	10,604
Number of realized losses	22.68	60.43	7	0	1,565.00	10,604
Days in the test phase	105.56	209.04	14	1	1,379.00	6,914
Days in the published phase	218.84	260.19	117	1	1,397.00	8,735
Days in the investable phase	395.61	323.85	329	1	1,364.00	3,246
Portfolio age in years	1.83	1.01	1.69	0.02	3.89	10,604
Panel B: All money-managing wikifolios						

Assets under management (000's of €)	66.72	453.07	5.45	0.001	11,604.84	2,290
Number of trades	312.60	582.86	122.50	10	6,685.00	2,290
Annualized portfolio return (%)	17.88	31.89	8.52	-28.98	92.19	2,290
Number of realized gains	83.31	161.82	30.00	0	1,934.00	2,290
Number of realized losses	49.95	105.36	17.00	0	1,565.00	2,290
Days in the test phase	42.74	106.47	6.00	1	1,072.00	1,246
Days in the published phase	110.25	152.59	48.00	1	1,218.00	2,071
Days in the investable phase	448.89	337.12	377.00	1	1,364.00	2,290
Portfolio age in years	2.10	1.02	2.10	0.07	3.89	2,290

Table 2. Variable definitions

This table provides definitions of the variables used in the analysis.

Variable	Description
$Sale_{ijt}$	Takes the value one if a position *i* is sold on day *t* by portfolio manager *j*, and zero otherwise, with observations including any day in which a transaction takes place
$Gain_t$	Takes the value one if a position is in the gain domain at time t, and zero otherwise
Post-Test	Takes the value one if a transaction occurs in either the published or the test phase
Published	Takes the value one if a transaction occurs in the published phase
Investable	Takes the value one if a transaction occurs in the investable phase
AUM	Time series data of assets under management, measured in thousands of euros
Portfolio Return	Overall portfolio return since the wikifolio's inception
Sharpe Ratio	Quarterly Sharpe ratio for each wikifolio
Number of $Holdings_{jt}$	Time series data of the number of holdings at time t by portfolio manager j
Number of $Transactions_j$	Total number of transactions by portfolio manager *j* over the whole observation period
Market Returns	Seven different non-overlapping market returns, with periods ranging from *t* - 1 to *t* - 365

Table 3. Transparency and the disposition effect

This table presents the results of our main regression specifications. The dependent variable is the dummy *sale* taking the value one if a sale takes place at time *t*, and zero otherwise. The independent variable *gain* takes a value of one for every position in the portfolio at time *t* in the gain region, and zero otherwise. The first is a simple specification with *gain* as our main explanatory variable. The second specification includes only observations from the *test* phase, the third only observations from the *published* phase, and the fourth only observations from the *investable* phase. The fifth specification includes a test for the DID in trading in the *test* phase or subsequent phases. The sixth specification includes interaction terms between the *phase* dummy variables and the *gain* variable. The control variables included are assets under management (*AUM*, reported in millions of euros) at time t. Not reported are the control variables for the number of transactions, the portfolio's Sharpe ratio, and market returns in several non-overlapping time periods. All columns include week of the year and year fixed effects (FE). Robust standard errors clustered by trader ID and week are reported in parentheses, with *** p < 0.01, ** p < 0.05, and * p < 0.1.

	(1)	(2)	(3)	(4)	(5)	(6)
	Sale	*Sale – Test*	*Sale – Published*	*Sale – Investable*	*Sale – DID*	*Sale –* all phases
Gain	0.0845***	0.113***	0.0984***	0.0720***	0.112***	0.112***
	(0.00267)	(0.00527)	(0.00339)	(0.00327)	(0.00544)	(0.00546)
*Gain*Post-Test*					-0.0289***	
					(0.00561)	
Post-Test					-0.0382***	
					(0.00454)	
*Gain*Published*						-0.0144**
						(0.00564)
*Gain*Investable*						-0.0385***
						(0.00598)
Published						-0.0423***
						(0.00465)
Investable						-0.0478***
						(0.00500)
*Gain*AUM*					-0.0120***	-0.00975***
					(0.00261)	(0.00236)
AUM					0.00427	0.00317
					(0.00265)	(0.00266)
Observations	6,421,124	610,856	2,109,338	3,700,880	6,421,124	6,421,124
Adjusted R^2	0.102	0.216	0.126	0.060	0.103	0.104
Number of ID clusters	10,587	4,041	8,235	3,379	10,587	10,587
Trader FE	YES	YES	YES	YES	YES	YES
Week and year FE	YES	YES	YES	YES	YES	YES

Table 4. Regression analysis of the impact of outliers

This table presents the results of our main regression specifications, controlling for outliers in the control variables. The dependent variable is the dummy and it takes the value one if a *sale* takes place at time t, and zero otherwise. The independent variable *gain* takes the value of one for every position in the portfolio at time t in the gain region, and zero otherwise. This regression table excludes outliers for our key control variables for trading activity, namely, assets under management, the number of activities (trades), the number of holdings, and the portfolio return. The first model includes all portfolios, as before. Columns (2) to (5) exclude the upper and lower deciles in the respective category. For example, column (3) excluded portfolios with a total of more than 2,702 or fewer than 116 trades. Column (6) excludes all outliers as follows: AUM (0.000341 | 0.09704), number of activities (116 | 2,702), number of holdings (13 | 130), and portfolio returns (-0.0874165 | 2.971). All specifications include trader, week, and year fixed effects. Robust standard errors clustered by trader ID and week are reported in parentheses, with *** p < 0.01, ** p < 0.05, and * p < 0.1.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	*Sale* – all	*Sale – AUM*, excluding outliers	*Sale – activities*, excluding outliers	*Sale – holdings*, excluding outliers	*Sale – return*, excluding outliers	*Sale* – all, excluding outliers
Gain	0.112***	0.139***	0.0977***	0.0932***	0.111***	0.146***
	(0.00520)	(0.0260)	(0.00588)	(0.00524)	(0.00525)	(0.0240)
*Gain*Post-Test*	-0.0289***	-0.0624**	-0.0204***	-0.0204***	-0.0284***	-0.0796***
	(0.00540)	(0.0252)	(0.00601)	(0.00536)	(0.00549)	(0.0231)
Post-Test	-0.0382***	-0.0263***	-0.0361***	-0.0335***	-0.0381***	-0.0128
	(0.00421)	(0.00848)	(0.00454)	(0.00473)	(0.00433)	(0.00777)
*Gain*AUM*	-0.0120***	-0.314**	-0.0138***	-0.0099***	-0.0104***	-0.161
	(0.00267)	(0.142)	(0.00336)	(0.00234)	(0.00369)	(0.162)
AUM	0.00427	0.111	0.00284	0.00459*	0.00419	0.0334
	(0.00266)	(0.134)	(0.00417)	(0.00273)	(0.00319)	(0.130)
Number of holdings	-2.86e-06	-5.61e-05	-0.0001***	-3.05e-05	1.04e-05	-0.000113*
	(5.09e-05)	(4.51e-05)	(3.28e-05)	(4.54e-05)	(6.20e-05)	(5.88e-05)
Observations	6,421,141	2,334,221	5,122,041	5,064,630	5,136,814	1,300,416
Adj. R^2	0.025	0.022	0.022	0.021	0.024	0.019
Trader FE	YES	YES	YES	YES	YES	YES
Week and year FE	YES	YES	YES	YES	YES	YES

Table 5. Controlling for survivorship bias

The table presents the results of our main regression specifications for different groups. The dependent variable is a dummy that takes the value one if a *sale* takes place at time *t*, and zero otherwise. The independent variable *gain* takes a value of one for every position in the portfolio at time *t* in the gain region, and zero otherwise. The first specification considers all observations from all portfolios in all phases. The second considers all observations from those portfolios that become *investable*. The third to eighth specifications compare the coefficient on the *gain* variable for portfolios in the test phase that never become published (column (3)), become published but not investable (column (4)), and become investable (column (6)). The table also shows the coefficients for the published phase for those portfolios that become published (column (5)) and investable (column (7)), and for the investable phase for only portfolios that become investable (column (8)). All specifications include trader, week and year fixed effects. Robust standard errors clustered by trader ID and week are reported in parentheses, with *** p < 0.01, ** p < 0.05, and * p < 0.1.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sale – all observations	*Sale* – all trades, for portfolios	*Sale* – test phase, for portfolios	*Sale* – test phase, for portfolios	*Sale* – published phase, for	*Sale* – test phase, for portfolios	*Sale* – published phase, for	*Sale* – investable phase, - for

		that trade in all phases	that trade only in the test phase	that trade in the test and published phases	portfolios that trade in the test and published phases	that trade in all phases	portfolios that trade in all phases	portfolios that trade in all phases
Gain	0.112***	0.135***	0.114***	0.102***	0.104***	0.127***	0.0875***	0.0720***
	(0.00546)	(0.0170)	(0.00666)	(0.00989)	(0.00437)	(0.0164)	(0.00468)	(0.00327)
*Gain*Publ.*	-0.0144**	-0.0474***						
	(0.00564)	(0.0160)						
*Gain*Invest.*	-0.0385***	-0.0584***						
	(0.00598)	(0.0165)						
Published	-0.0423***	-0.0339***						
	(0.00465)	(0.00694)						
Investable	-0.0478***	-0.0403***						
	(0.00500)	(0.00771)						
*Gain*AUM*	-0.0097***	-0.0472***						
	(0.00236)	(0.0129)						
AUM	0.00317	0.0206						
	(0.00266)	(0.0149)						
Observations	6,421,124	1,570,884	393,181	137,373	1,404,624	80,302	704,714	3,700,880
Adj. R^2	0.104	0.061	0.210	0.227	0.144	0.217	0.086	0.060
Number of ID clusters	10,587	711	1,681	1,593	5,516	767	2,719	3,379

Table 6. Learning effects

The table presents the results of our main regression specifications for different groups. The dependent variable is the dummy *sale* taking the value one if a sale takes place at time *t*, and zero otherwise. The independent variable *gain* takes a value of one for every position in the portfolio at time *t* in the gain region, and zero otherwise. The first two specifications consider all observations from all first portfolios of all users if they have at least two portfolios, excluding subsequent ones. The third and fourth specifications consider all observations from all the last portfolios of every user. All specifications include trader, week, and year fixed effects. Robust standard errors clustered by trader ID and week are reported in parentheses, with *** p < 0.01, ** p < 0.05, and * p < 0.1.

	(1) All first portfolios, DID	(2) All first portfolios, three phases	(3) All last portfolios, DID	(4) All last portfolios, three phases
Gain	0.0989***	0.0992***	0.112***	0.113***
	(0.0111)	(0.0111)	(0.00999)	(0.00999)
*Gain*Post-Test*	-0.0199*		-0.0184*	
	(0.0111)		(0.0112)	
Post-Test	-0.0391***		-0.0431***	
	(0.00729)		(0.00934)	
*Gain*Published*		-0.0129		-0.00531
		(0.0111)		(0.0111)
*Gain*Investable*		-0.0243**		-0.0313**
		(0.0117)		(0.0126)
Published		-0.0396***		-0.0477***
		(0.00732)		(0.00924)
Investable		-0.0523***		-0.0530***
		(0.00853)		(0.00968)
*Gain*AUM*	-0.0107***	-0.00987***	-0.0373	-0.0218
	(0.00164)	(0.00150)	(0.0255)	(0.0259)
AUM	0.00702***	0.00661***	0.0221	0.0149
	(0.00213)	(0.00222)	(0.0137)	(0.0151)
Observations	2,063,808	2,063,808	922,638	922,638
Adjusted R^2	0.079	0.079	0.031	0.031
Number of ID clusters	2,279	2,279	4,851	4,851
Controls	YES	YES	YES	YES
Trader FE	YES	YES	YES	YES

Week and year FE	YES	YES	YES	YES

Table 7. Learning effects

This table reports the coefficient on the *gain* variable for users just before and after changing the status of their portfolio. Column (1) shows the results for all trades in the last 10 days of the test phase, column (2) the results for all trades in the first 10 days of the published phase, column (3) the results for the last 10 days in the investable phase, and the last column shows the results for trades within the first 10 days of the investable phase. All specifications include trader, week, and year fixed effects, as well as time-variant control variables. Robust standard errors clustered by trader ID and week are reported in parentheses, with *** p < 0.01, ** p < 0.05, and * p < 0.1.

	(1) Last 10 days of the test phase	(2) First 10 days of the published phase	(3) Last 10 days of the published phase	(4) First 10 days of the investable phase
Gain	0.158***	0.137***	0.140***	0.0962***
	(0.00720)	(0.00417)	(0.00517)	(0.00486)
*Gain*AUM*				-0.0129
				(0.00962)
AUM				0.00143
				(0.0184)
Observations	107,808	267,655	246,002	151,521
Adjusted R^2	0.432	0.269	0.344	0.216
Number of ID clusters	3,992	8,183	8,104	3,349
Controls	YES	YES	YES	YES
Trader FE	YES	YES	YES	YES
Week and year FE	YES	YES	YES	YES

Table 8. Assets under management, DID

This table presents the results of our main regression specifications for different groups. The dependent variable is the dummy *sale* taking the value one if a sale takes place at time *t*, and zero otherwise. The independent variable *gain* takes a value of one for every position in the portfolio at time *t* in the gain region, and zero otherwise. The first specification considers all observations from all investable portfolios. The second considers all observations from investable portfolios that do not have accumulated assets at the time of observation (sale of a holding). The third observes the behavior of portfolio managers once the portfolio has assets under management. All specifications include trader, week, and year fixed effects. Robust standard errors clustered by trader ID and week are reported in parentheses, with *** p < 0.01, ** p < 0.05, and * p < 0.1.

	(1) *Investable*, all	(2) *Investable, AUM* = 0	(3) *Investable, AUM* > 0
Gain	0.134***	0.141***	0.131***
	(0.0168)	(0.0188)	(0.0226)
*Gain*Post-Test*	-0.0582***	-0.0509***	-0.0610***
	(0.0164)	(0.0177)	(0.0223)
Post-Test	-0.0350***	-0.0425***	-0.0318***
	(0.00751)	(0.0120)	(0.00837)
*Gain*AUM*	-0.0101***		-0.00847***
	(0.00239)		(0.00231)
AUM	0.00326		0.00442
	(0.00275)		(0.00268)

Observations	4,485,931	1,395,959	3,089,907
Adjusted R^2	0.064	0.095	0.049
Number of ID clusters	3,388	3,281	2,161
Controls	YES	YES	YES
Trader FE	YES	YES	YES
Week and year FE	YES	YES	YES

Table 9. Assets under management, all phases

This table presents the results of our main regression specifications for different groups. The dependent variable is the dummy *sale* taking the value one if a sale takes place at time *t*, and zero otherwise. The independent variable *gain* takes a value of one for every position in the portfolio at time *t* in the gain region, and zero otherwise. The first specification considers all observations from all investable portfolios. The second considers all observations from investable portfolios that have not accumulated assets at the time of observation (sale of a holding). The third observes the behavior of portfolio managers once the portfolio has assets under management. All specifications include trader, week, and year fixed effects. Robust standard errors clustered by trader ID and week are reported in parentheses, with *** p < 0.01, ** p < 0.05, and * p < 0.1.

	(1) Investable, all	(2) Investable, AUM = 0	(3) Investable, AUM > 0
Gain	0.134***	0.141***	0.131***
	(0.0169)	(0.0188)	(0.0228)
*Gain*Published*	-0.0472***	-0.0476***	-0.0500**
	(0.0164)	(0.0178)	(0.0231)
*Gain*Investable*	-0.0607***	-0.0518***	-0.0631***
	(0.0166)	(0.0179)	(0.0226)
Published	-0.0325***	-0.0405***	-0.0256***
	(0.00738)	(0.0119)	(0.00856)
Investable	-0.0422***	-0.0505***	-0.0397***
	(0.00787)	(0.0122)	(0.00894)
*Gain*AUM*	-0.00955***		-0.00815***
	(0.00235)		(0.00230)
AUM	0.00301		0.00428
	(0.00271)		(0.00263)
Observations	4,485,931	1,395,959	3,089,907
Adjusted R^2	0.064	0.095	0.050
Number of ID clusters	3,388	3,281	2,161
Controls	YES	YES	YES
Trader FE	YES	YES	YES
Week and year FE	YES	YES	YES

Figure 1. Portfolio life cycle

This figure presents the three main phases of a wikifolio. In the test phase, traders can try out their strategy and build a track record of their activities. None of the trades are public, unless the trader later decides to publish the portfolio. In the second phase (published phase), the portfolio is visible to every visitor on the platform. Now, previously hidden trades are visible. However, no user can invest money in this portfolio. To create an investable portfolio, each wikifolio manager must comply with certain quality criteria, including investments earmarked by at least 10 users, having spent at least 30 days in the published phase, ID checks, and phone interviews. Once the portfolio is investable, a certificate based on this specific portfolio is listed on the stock exchange and given a unique identifier. From this point, everyone can invest in this certificate and therefore create assets under management for the respective portfolio manager. A wikifolio can be closed, and each trader can have several published portfolios, but formerly published portfolios will always be linked to the same account and be visible to the community.

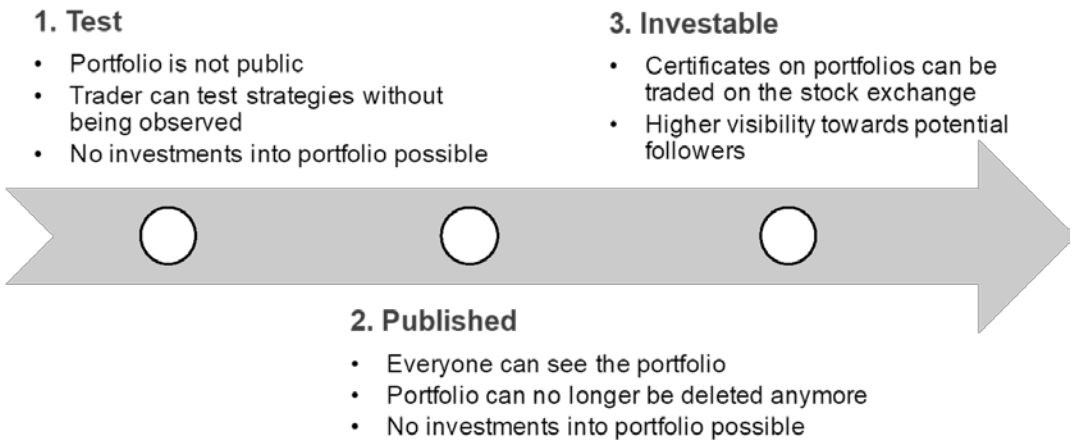


Figure 2. Portfolio overview

This figure illustrates a typical user's portfolio overview at wikifolio.com. Current holdings flash red (with a high saturation) or green (with a low saturation) every 10 seconds if the position is currently in the loss (red) or gain (green) domain, respectively. This overview is visible to all platform users.

	Price (Bid)	Piece	+/- since purchase	Weighting
Equities				49.1 %
ADOBE SYSTEMS US00724F1012	98.656	20	-3.08 %	2.8 %
BARRICK GOLD CORP CA0679011084	15.675	100	+148.02 %	2.3 %
ELECTRONIC ARTS US2855121099	75.667	40	+5.42 %	4.4 %
ELMOS SEMICONDUCTOR AG DE0005677108	13.555	150	-4.01 %	2.9 %
IROBOT CORP. US4627261005	44.985	25	+10.69 %	1.6 %
JUNGHEINRICH AG O.N.VZO DE0006219934	29.033	45	-0.05 %	1.9 %
KUKA AG DE0006204407	80.140	25	-4.82 %	2.9 %
MUEHLBAUER HOLD.O.N. DE0006627201	41.235	30	+35.59 %	1.8 %

Figure 3. Trading history

This figure shows the trading history of a typical wikifolio once it is published. This overview is visible to each webpage visitor and begins with the latest trade executed in the portfolio. It shows traded stocks, order types, times, prices, and the weighting of the positions, as well as the relative returns of the transactions.

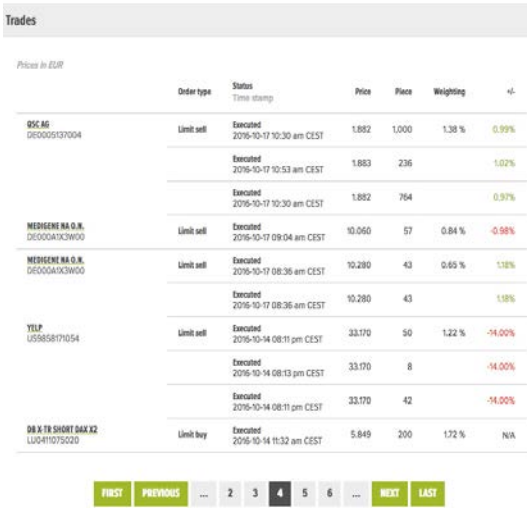
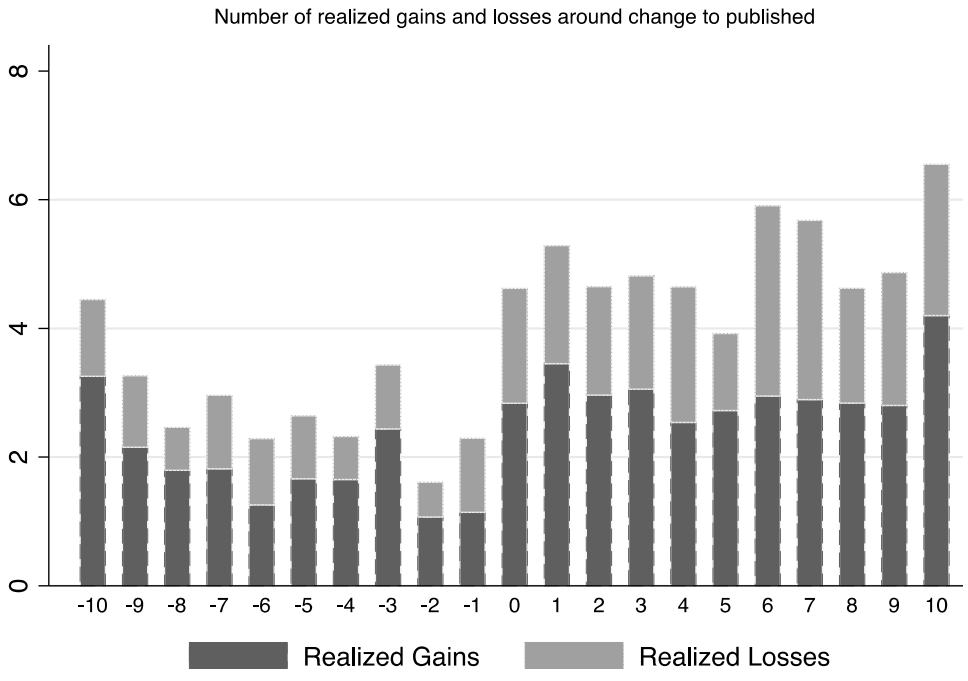


Figure 4. Transactions realized around changes in transparency: gains and losses

This figure shows the average number of gains and losses realized per day around phase changes. The first graph depicts these values around the change from being a *test* to *published*, while the second is for the change from *published* to *investable*. The *x*-axis shows the numbers of days before and after a phase shift, with day zero being the first day in the new phase.



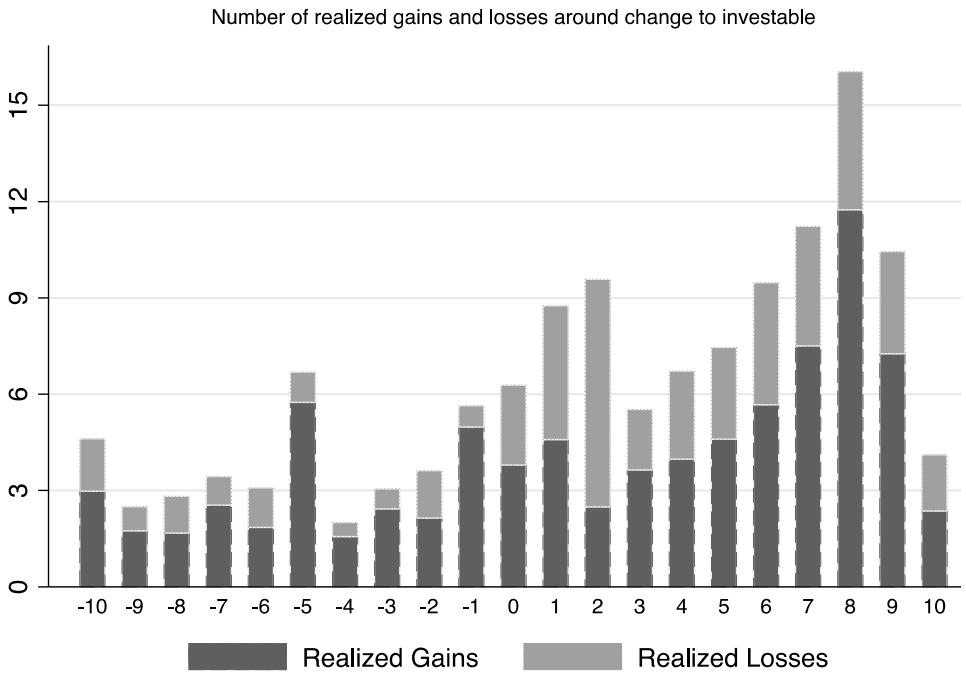
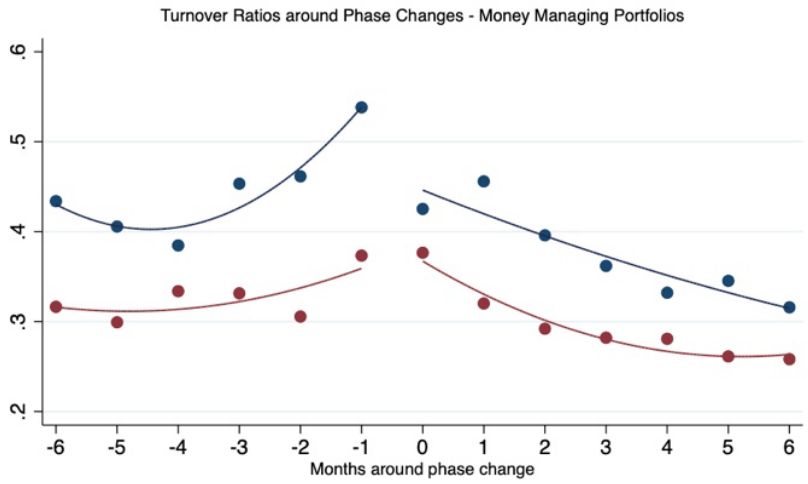


Figure 5. Transactions realized around changes in transparency: turnover ratios

This figure depicts the average turnover ratios in the months leading up to and after a phase change. We adapt the turnover ratio following Agrawal et al. (2014). We define a fund's monthly turnover ratio as the minimum dollar values of purchases and sales, divided by total net assets at the beginning of the quarter. The blue (red) line depicts the turnover ratios before and after the published (investable) phase. We also include a subset of our analysis showing only money-managing portfolios, that is, those portfolios that will accumulate outside investment at some point of their life cycle.



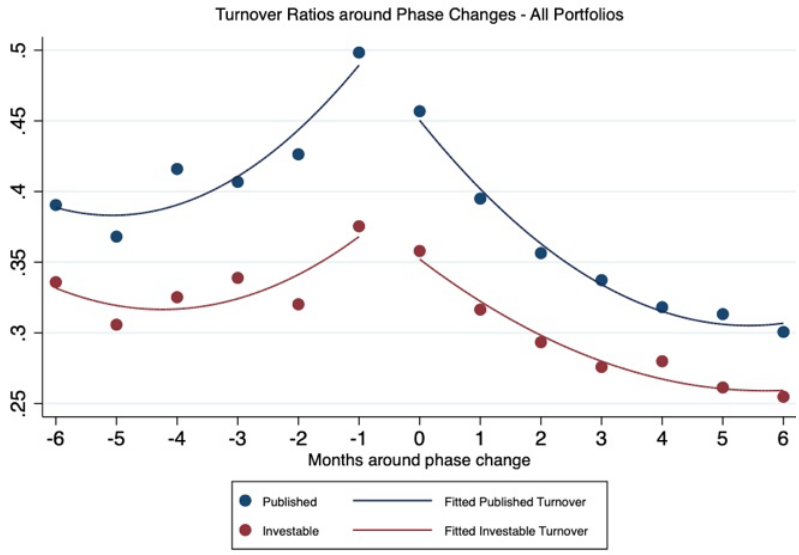


Figure 6. Trade representation on eToro

This figure shows the typical overview provided for the users of eToro, an alternative social trading platform focusing on forex. This snapshot highlights the strong emphasis on the percentage of (realized) profitable trades, while, at wikifolio.com, the focus is on current holdings and (paper) losses and gains.