PERSISTENT CHASING OF PAST PERFORMANCE WHEN SELECTING MUTUAL FUNDS

Technical Report

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TECHNICAL REPORT

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Abstract

Investors often choose mutual funds based on past performance, despite being warned by regulatory-mandated disclaimers that past performance does not predict future returns. Investors would receive better returns, if they instead choose mutual funds with lower fees. We explore this relationship between fees and performance in two experiments under a new paradigm with repeated decisions and stochastically generated fund returns. Participants consistently and persistently chased past performance across both experiments. In Experiment 1, experienced investors (N = 400) were not better at minimizing fees when given a standard regulatory discloser than when given no disclosure at all. In Experiment 2, non-investors without prior experience (N = 596), again were not helped by a standard regulatory disclosure, but were helped by a new social disclaimer making salient the benefits of low-fee mutual funds. While the standard regulatory disclaimer performed not better than no disclaimer in most cases, it actually created a perverse effect of shifting low financial-literacy individuals more towards the high-fee mutual fund. We show that individuals who lack both the knowledge and the prior personal experience are most at risk, and can benefit most from interventions such as the new disclaimer tested here.

Keywords: Behavioural finance, personal finance, investment, financial literacy, mutual funds

1. Introduction

Mutual funds are the most common way for people to invest in the financial markets. In the United States, 45% of households invest in mutual funds, with around 50% of household retirement wealth invested in mutual funds (Investment Company Institute, 2019). Mutual funds pool money together from many investors, providing easy access to the financial markets, offering diversified investment solutions, and dealing with many of the logistic and administrative issues around financial asset ownership. For providing these services, mutual funds charge fees, which are on average equal to 0.55% of assets per year, or some US$100 billion in total (Investment Company Institute, 2019).

Despite the large sums of money being paid as mutual funds fees every year, investors mostly disregard costs when choosing funds, picking instead the funds with the best past performance (Barber, Odean, & Zheng, 2005; Choi, Laibson, & Madrian, 2010; Fisch & Wilkinson-Ryan, 2014; Pontari, Stanaland, & Smythe, 2009; Wilcox, 2003). Chasing past performance is a poor fund selection strategy, as long-term analyses have confirmed that mutual funds cannot consistently return better-than-average performance (Carhart, 1997; Jain & Wu, 2000; Malkiel, 1995), with any individual over-performance being mostly attributed to luck (Mercer, Palmiter, & Taha, 2010). The chasing of past performance can be observed in many other domains of human behaviour (Shanks, Tunney, & McCarthy, 2002) and animal behaviour (Townsend-Mehler, Dyer, & Maida, 2010), and it can be considered rational behaviour in environments in which there is auto-correlation (i.e., hot weather today can predict hot weather tomorrow, because it is summer). However, in financial markets, there is no auto-correlation: a stock which provides good returns today is as likely to provide good returns tomorrow as any other stocks. Market prices behave

in what has been called a "random walk," with no observable and predictable trend (Malkiel, 2003). The intricacies of the dynamics of the financial markets can be very non-intuitive and lead to many such behavioural finance biases (for comprehensive reviews, see Barberis & Thaler, 2003; Shefrin, 2004).

Because investors tend to disregard fees, they end up overpaying for their investments (Fisch, 2010; Houge & Wellman, 2007), with no observable benefits in terms of added services (Choi et al., 2010). In fact, cheaper funds on average tend to provide better performance in the long-run, as they are not burdened by the high recurring costs which can deteriorate fund returns (Carhart, 1997; Haslem, Baker, & Smith, 2008). The ideal strategy therefore is for investors to choose the fund with the lowest fees within a given asset class. To try to reduce the importance given to past performance as a selection criteria, the US Securities and Exchange Commission requires fund administrators to warn investors that past performance does not predict future returns.

All of the investment decision research mentioned thus-far have been single choice tasks, providing participants with extensive information and asking them to make a single decision, without giving participants feedback and allowing them to learn over time. This is curious, given field evidence that investors learn to invest based on how assets perform over time (Choi, Laibson, Madrian, & Metrick, 2009; Greenwood & Shleifer, 2014). Past single-shot experiments have forced an unrepresentative positive relationship between past fees and performance, in order to create a trade-off between fee-minimization and performance bias (e.g., Choi et al., 2010; Fisch & Wilkinson-Ryan, 2014; Newall & Parker 2018).

Our research explores the relationship between past returns, fees, and fund selection, using a new approach with repeated choices. Our paradigm dynamically and stochastically creates simulated index tracking fund returns by taking the S&P 500 index and introducing random noise with mean zero. This is representative of the current index fund industry, in which funds try to closely replicate the index, but still fluctuate around it, randomly, due to unpredictable tracking error. This guarantees that in the long-run, gross of fees, one fund will not outperform the other. Selections of the cheaper funds were therefore the only strategy that maximized fees ex-ante. In two experiments we will ask participants to choose repeatedly between two funds, one high-fee and one low-fee, and we predict that they will chase past performance while ignoring fees. We test if repeated experience, choosing over a period of 60 months, helps participants reduce the chasing of past performance, as participants learn how the task's ecological design operates. We will also test the effectiveness of the standard SEC disclaimer, and test another disclaimer that could be more efficient in helping investors to minimize fees.

2. Methodology

In two experiments[2], we explored if investors persistently chase past performance or minimize management fees when choosing between two simulated index tracking funds. Participants were asked to choose between one low-fee and one high-fee fund, repeatedly, for 60 trials. Each trial represented one month of investment based on real historical market returns. Apart from the difference in fees, the returns of the two funds were generated dynamically by the same underlying stochastic process: the index return plus a noise component. Because the noise had a mean of zero, both funds had the same average gross performance (before fees). Participants were compensated financially according to the returns of the funds they selected.

Both experiments were between-subjects designs, manipulating a disclaimer which was presented (or not) before participants started selecting funds. Experiment 1 had two experimental conditions. In the *standard condition*, participants saw an industry standard disclaimer used when marketing mutual funds, which said "Past performance does not guarantee future results." In the *no-disclaimer condition*, participants saw a neutral message instead, which was "Please click the button below when you are ready to start the task." Experiment 2 repeated the two conditions from Experiment 1 and added one additional experimental condition, the new *social condition*, which said "Some people invest based on past performance, but funds with low fees have the highest future results." This is a social manipulation first used in Newall and Parker (2018). The aim of this manipulation was to make the futility of chasing past returns more salient than it is with the industry standard disclaimer.

2.1 Participants

Experiment 1 focused on participants who had previously made investments in financial markets. We recruited 400 participants (130 females, 267 males; age: M = 36.7 years, SD = 11.6 years) on-line using Prolific Academic. There were 200 participants in each condition. No participants were excluded from the analysis. Participation was restricted to United States nationals, and to individuals who had answered "yes" to the pre-screening question "Have you ever made investments (either personal or through your employment) in the common stock or shares of a company?" Participants were paid a fixed amount of US$ 2.55 (£2.00) for completing the task and an additional performance-based bonus of US$ 4.36 (SD = US$ 1.53).

For Experiment 2, we recruited participants who had not previously made investments in financial markets. We originally recruited 600 participants on-line using Prolific Academic, 200 in each condition. Four data-sets, from two participants were excluded for having completed the task twice. The remaining 596 participants were allocated to experimental conditions as follows: 200 in no-disclaimer, 198 in standard, and 198 in social (341 females, 247 males; age: M = 32.5 years, SD = 12.6 years). Participation was restricted to United States nationals, and to individuals who had answered "no" to the same pre-screening question as above. Participants were paid a fixed amount of US$ 2.52 (£2.00) and an additional performance-based bonus of US$ 4.42 (SD = US$ 1.51).

2.2 Task

Before the task began, a disclaimer was shown on screen, depending on the experimental condition. The disclaimer remained displayed on the screen throughout the task. Afterwards, two buttons were

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[2] The 2 experiments were pre-registered on-line at https://osf.io/2dbsy and https://osf.io/kmrt3.

presented side by side on the screen, labelled Fund A and Fund B, each representing an available mutual fund. One fund was a low-fee fund, with an annual management fee of 0.1%, and one fund was a high-fee fund, with an annual management fee of 0.7%. The positioning and labelling of the two funds on the screen was randomized. The management fees for each fund were always displayed underneath each fund.

Participants were shown a historical 12-month return for each fund before making their first selection. These returns were calculated using the actual monthly S&P 500 returns for the 12-month period from December 2012 to November 2013, plus a random noise component, minus fees, which will be explained below. Participants were instructed that this historical return would not count towards their accumulated bonus. After participants made their first selection, these historical returns were removed from the screen. After each selection, participants were shown the returns for both funds (full feedback), before being asked to select a mutual fund again. The task lasted for 60 trials, each representing one month of real historical market data. After completing the fund selection task, participants were asked to answer the 13-question financial literacy questionnaire from Fernandes, Lynch, and Netemeyer (2014).[3] Overall, the task took 10.15 minutes to complete (SD = 5.22).

The returns for each fund were calculated dynamically, based on the monthly S&P 500 returns for the period of 60 months from December 2013 to November 2018. For each fund, we added a normally distributed noise component, and deducted the relevant fees, from the S&P 500 return for that month. The noise component was stochastically drawn from a normal distribution with mean zero

and standard deviation of 2%. The 12-month historical returns for the first trial were calculated in the same way, but over a period of 12 individuals months added together. Because the mean of the noise component was zero, the only long-term difference between the two funds was the difference in fees. Participants were paid according to the accumulated returns of the fund they chose, with US$1 paid for every 10% they had at the end of the task, pro-rata. Participants who selected the low-fee fund more than half the time earned a significantly higher average bonus than those who selected the low-fee fund less than half the time (US$4.50 vs. US$4.16, $t(507)=3.08$, $p=.002$).

2.3 Variables
The dependent variable was the selection of the low-fee fund at each trial: higher is better, as selections from the low-fee fund reduced management fees paid and resulted in higher returns. It was a binary variable, coded as one being the selection of the low-fee fund, and zero being the selection of the high-fee fund, at each trial.

The independent variable was the experimental manipulation of the disclaimer, a categorical variable, which had two levels in Experiment 1 (none and standard) and three levels in Experiment 2 (none, standard, and social).

There were two main moderators: the difference in returns, calculated as the returns from the low-fee fund minus the returns from the high-fee fund, positive values meaning that the low-fee fund performed better than the high-fee fund in that period by that amount; and the financial literacy scores, between 0 and 13, higher scores equal to higher financial literacy.

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[3] Two questions (7 and 11) were related to mutual funds and could have been influenced by the task. Eliminating these questions from the analyses do not change any of the findings. Financial literacy rates were not influenced by the disclaimers.

3. Results

Two separate analyses were conducted[4]. First, we analysed the first selection using a one-way general linear model with a binominal logit link function. This replicates the previous research in this area, in which subjects are asked to choose based on observed (and not experienced) returns. The model included one between-subjects factor which was the disclaimer, and two covariates: the 12-month historical difference in returns and financial literacy scores. Only the main effects and first order interactions were included. Second, we analysed selections from each subsequent trial using a general linear mixed-effects model with a binominal logit link function. This was a repeated-measures analysis which allowed for learning over time. The model included one between-subjects factor which was the disclaimer, and three covariates: trial number, previous trial return difference, and financial literacy scores. Only the main effects and first order interactions were included.

3.1 Experiment 1

3.1.1 First selection

The omnibus test for the model on first selections in Experiment 1 was significant ($\chi^2(6)$=88.57, p<.001) There was a main effect of historical difference in returns on low-fee fund selections (b=14.17, SE=1.91, $\chi^2(1)$=76.83, p<.001). Participants chased historical performance, selecting more often the fund that had the highest historical returns.

There was no main effect of disclaimer ($\chi^2(1)$=0.79, p=.38). Participants chose the low-fee fund as frequently when there was the standard disclaimer (84.9%, SE=2.9%) as when there was no disclaimer (86.6%, SE=3.0%). Therefore the disclaimer overall

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[4] The run code, raw data, and R script are deposited online at https://osf.io/k8us3.

does not seem to have helped participants to ignore past performance and focus on fees.

However, there was a significant interaction between historical returns and disclaimer ($\chi^2(1)$=6.46, p=.01). The slope for the relationship between historical returns and low-fee fund selection was steeper in the case of no disclaimer (b=18.82, SE=3.12) than in the case of standard disclaimer (b=9.51, SE=2.17). Therefore the standard disclaimer was able to at least partially reduce, if not eliminate, the chasing of past performance, which was more extreme when there was no disclaimer.

There was no main effect of financial literacy (b=0.11, SE=0.06, $\chi^2(1)$=1.96, p=.16) at the first trial, with no difference in low-fund selection according to level of literacy. None of the other two interactions were significant (both ps>.15).

3.1.2 Subsequent selections (trials 2-60)

The omnibus test for the model on subsequent selections (trials 2-60) in Experiment 1 was significant ($\chi^2(7)$=116.01, p<.001).

There was a main effect of trial number (b=0.01, SE=0.003, $\chi^2(1)$=9.03, p=.003). Participants selected more often from the low-fee fund as the task progressed, perhaps as a result of learning that selections from the low-fee fund provided better returns. However, this effect was not strong and participants still chased past performance even at the end of the task.

There was a main effect of previous trial return difference (b=4.29, SE=0.67, $\chi^2(1)$=51.85, p<.001). As in the first trial, the fund with the highest returns in the previous trial was selected more often in each

subsequent trial, with individuals chasing past performance. There was also a main effect of financial literacy (b=0.24, SE=0.05, $\chi^2(1)$=18.73, p<.001). Participants with higher literacy chose the low-fee fund more frequently.

There was no main effect of disclaimer ($\chi^2(1)$=0.50, p=.48). Throughout the entire task, participants chose the low-fee fund as frequently when there was the standard disclaimer (83.5%, SE=3.0%) as when there was no disclaimer (86.4%, SE=2.6%).

The effect of disclaimer however was significant in the interactions with the two covariates. There was a significant interaction between disclaimer and previous return difference ($\chi^2(1)$=17.30, p<.001). The slope for the relationship between previous returns and low-fee fund selection was steeper in the case of no disclaimer (b=7.02, SE=0.95) than in the case of standard disclaimer (b=1.57, SE=0.92). As in the case of the first trial, the standard disclaimer partially reduced the chasing of past performance.

There was a significant interaction between disclaimer and literacy ($\chi^2(1)$=6.80, p=.009). Financial literacy was more influential to selections of low-fee fund when the standard disclaimer was shown (b=0.38, SE=0.08) and not as influential when there was no disclaimer (b=0.11, SE=0.07), with more uniform behaviour in the latter case. Even though the chasing of past performance was reduced, in the case of low literacy participants, it translated into a much more frequent selection of the high-fee fund, as confirmed by the main effect of financial literacy described above. It seems that the standard disclaimer had a perverse effect for low financial literacy participants, causing them to prefer the high-fee fund.

3.2 Experiment 2

3.2.1 First selection

The omnibus test for the model on first selections in Experiment 2 was significant ($\chi^2(9)$=83.57, p<.001)

There was a main effect of historical difference in returns on low-fee fund selections (b=8.50, SE=1.27, $\chi^2(1)$=53.87, p<.001), as in Experiment 1. Participants chased historical performance, selecting more often the fund that has the highest historical returns.

Unlike Experiment 1, there was a main effect of disclaimer in Experiment 2 ($\chi^2(2)$=21.48, p<.001). In a post-hoc test, we confirmed that participants chose the low-fee fund more frequently with the social disclaimer (88.7%, SE=2.5%), compared to both the standard disclaimer (72.2%, SE=3.3%, z=4.00, p<.001) and no disclaimer (74.1%, SE=3.7%, z=3.31, p=.003). There was no significant difference between the standard disclaimer and no disclaimer (z=0.39, p=.92). Therefore the new social disclaimer led to a significant improvement in behaviour, with participants choosing the low-fee fund more often. As in Experiment 1, the standard disclaimer did not influence behaviour significantly in the first trial.

There was a significant interaction between historical returns and disclaimer ($\chi^2(2)$=10.29, p=.006), as in Experiment 1. The slope for the relationship between historical returns and low-fee fund selection was steeper in the case of no disclaimer, in a post-hoc test (b=13.30, SE=2.34) than in the case of standard disclaimer (b=4.10, SE=1.82, z=3.11, p=.005). The standard disclaimer led to flatter responses with regards to historical returns, and lower chasing of past performance. The slope for the social disclaimer was not significantly different from the other two (b=8.10, SE=2.39, both ps>.25). While in the case of social disclaimer the participants still chased past performance, they did so at a much higher overall selection of low-fee funds on average, as described in the previous paragraph.

As before, there was no main effect of financial literacy (b=0.04, SE=0.04, $\chi^2(1)$=1.00, p=.32), with no difference in low-fund selection according to level

of literacy in the first trial. None of the other interactions were significant (both ps>.80).

3.2.2 Subsequent selections (trials 2-60)

The omnibus test for the model on subsequent selections (trials 2-60) in Experiment 2 was significant ($\chi^2(10)=316.13$, $p<.001$).

In contrast to Experiment 1, there was a significant main effect of disclaimer ($\chi^2(2)=79.83$, $p<.001$). As in the first trial, participants in the social disclaimer condition selected from the low-fee fund (89.4%, SE=1.4%) more often than in the other two conditions (both zs>7.1, both ps<.001), in a post-hoc test. There was no difference between no disclaimer and standard disclaimer (None: 65.8%, SE=3.2%; Standard: 66.3%, SE=3.2%; z=0.11, p=.99).

The remaining main effects were the same as in Experiment 1. There was a main effect of trial number (b=0.008, SE=0.002, $\chi^2(1)=13.83$, $p<.001$). Participants selected more often from the low-fee fund as the task progressed, as observed in Experiment 1. Despite their improvement over time, this effect was not strong and participant still chased past performance at the end of the task.

There was a main effect of previous trial return difference (b=6.31, SE=0.51, $\chi^2(1)=173.91$, $p<.001$). As in the first trial, the fund with the highest returns in the previous trial was selected more often in each subsequent trial, with individuals chasing past performance. There was also a main effect of financial literacy (b=0.11, SE=0.03, $\chi^2(1)=17.47$,

$p<.001$). Participants with higher literacy chose the low-fee fund more frequently.

The effect of disclaimer was significant in the interactions with the two covariates. There was a significant interaction between disclaimer and literacy ($\chi^2(2)=10.68$, p=.005). In post-hoc tests, financial literacy was more influential to selections of low-fee fund when the social disclaimer was shown (b=0.23, SE=0.04) when compared to both the standard disclaimer (b=0.06, SE=0.05, z=2.57, p=.03) and no disclaimer (b=0.04, SE=0.05, z=3.00, p=.008). There was no difference between the slope of the standard disclaimer and no disclaimer (z=0.38, p=.93), with these two conditions not being influenced by financial literacy. As a result, the social disclaimer had a stronger effect on choosing the low-fee fund for people with higher financial literacy.

There was a significant interaction between disclaimer and previous return difference ($\chi^2(2)=21.16$, $p<.001$). In post-hoc tests, the slope for the relationship between previous returns and low-fee fund selection was flatter in the case of the social disclaimer (b=3.17, SE=0.97) when compared with the standard disclaimer (b=6.79, SE=0.82, z=2.87, p=.01) and compared with no disclaimer (b=8.97, SE=0.82, z=4.59, $p<.001$). As before, there was no difference between standard disclaimer and no disclaimer (z=1.89, p=.14). As in the case of the first trial, the social disclaimer significantly reduced the chasing of past performance, but at a higher overall average selection of the low-fee fund.

4. Discussion

Participants persistently chased past performance instead of minimizing fees when choosing between two similar simulated index-tracking funds. This was observed both for their first decision, chasing historical past performance, replicating earlier research (Barber, Odean, & Zheng, 2005; Choi, Laibson, & Madrian, 2010; Fisch & Wilkinson-Ryan, 2014; Pontari, Stanaland, & Smythe, 2009; Wilcox, 2003); as well as for their repeated subsequent decisions, by choosing the fund which in which they directly experienced the performance in each previous trial. Because the returns were dynamically simulated with random noise, and therefore not auto-correlated, chasing past performance was guaranteed to be futile. Participants who chose the cheapest fund performed better in the task and earned higher rewards than those who tried to chase the returns.

We also showed that a social disclaimer was significantly better than no disclaimer or the standard disclaimer currently used throughout the industry. The social disclaimer led to a higher selections from the low-fee fund throughout, and also led to flatter relationships between selections and previous returns, reducing the chasing of past performance. In comparison, the standard regulatory-mandated disclaimer on past performance did not help participants.

The influence of the disclaimers was moderated by past performance, financial literacy and prior investments. While the standard disclaimer reduced the chasing of past performance, it did not eliminate it. In fact, the standard disclaimer had a perverse effect for low literacy and unexperienced participants, causing them to select more frequently from the more expensive fund. The standard disclaimer tells investors that past performance

should not be taken into account when choosing funds, but it does not provide with an alternative selection strategy to fill this newly created informational gap. It is possible that unexperienced investors replace past performance with a "price equals quality" heuristic, as it is not uncommon for consumers to use price as a proxy for quality (Rao, 2005). The social disclaimer corrects this problem by specifically highlighting low-fees as the optimal choice criteria instead of past performance.

Individuals with lower financial literacy performed worse in the task than individuals with higher financial literacy. However, it seems that having made prior investments in stocks helped those individuals with higher financial literacy, but was detrimental to individuals with lower financial literacy, as seen in the results in Experiment 1. It appears that a combination of improving financial literacy (which can, in theory, be learned independently of direct experience) and increasing prior experience with financial markets (which, plainly, can only be acquired via direct personal experience) is the best combination to help individuals to invest more smartly.

In fact, the accumulation of experience was evident during our task, which employed repeated decisions and allowed participants to learn about the simulated environment and funds over time. As the task progressed, participants may have noticed that chasing past performance was not the ideal strategy, as only by choosing the low-fee fund they would maximize their returns. While we did observe that the selection of low-fee funds increased as the task progressed, this was a relatively small effect, compared to the larger effects observed due to actual prior experiences with the financial markets,

as observed in the differences between Experiments 1 and 2.

4.1   Practical implications

In some aspects of life, individuals are good at finding the best deals, but in others, they are very poor. For example, research in health insurance has shown that individuals often select fully dominated products, which are more expensive and of lower quality (Bhargava, Loewenstein, & Sydnor, 2017). In mutual fund selection, individuals often disregard fees, which history has shown to be the best determinant of future performance in a noisy environment. Attempts to make fees and costs more salient via regulation does not seem to have helped. In our paradigm, the fees were prominently displayed throughout. There is evidence that investors are not as mindful of recurring annual fees as they are to upfront buying costs (Houge & Wellman, 2007). An on-going shift from high up-front charges to smaller but recurring annual charges might be helping hide the expenses in the volatility of market returns. This creates a renewed importance of highlighting the deterioration of returns called by expenses.

The chasing of past performance while disregarding fees has negative effects on the investment of individuals: it can lead to excessive shifting of assets between funds, which is costly, and it can inflate fees when cheaper options might be available. We showed that the traditional disclaimer is not efficient, and a new disclaimer needs to be considered, perhaps borrowing from the "nudge" industry, for example by appealing to social differences as the more efficient social disclaimer used in our research. We doubt that the original SEC disclaimer has been tested behaviourally, and with the new tools available today, it is important to test any such interventions. As Fischhoff (1999) stated, "One should no more release an untested risk communication message than an untested drug" (p. 70).

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