Not All Capital Gains are Consumed Equally

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Abstract

This paper studies how changes in the salience of investments affect consumption out of capital gains. We leverage granular, account-level data from 200,000 active investors on a leading mobile payment platform. The platform connects mutual fund investments with investors' expenditure records. We find that investments that are made more salient elicit a greater consumption response, exploiting two quasi-experiments that introduce exogenous variation in the displayed ranking of funds. First, the platform defaults to displaying the most recently acquired fund at the top of the holdings page, grouping it with older funds from the same company. We find that investors' consumption response is stronger to capital gains from funds of the same companies as their recent purchases. Second, after a display setting change which allowed sorting by performance, the consumption response to top-performing funds becomes more pronounced compared to lower-performing ones.

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1 Introduction

Individuals are presented with diverse forms of information on a daily basis, and recent innovations in financial technology have introduced an even greater multitude and immediacy of information. A wealth of information may create a poverty of attention. The information individuals act upon is, hence, largely determined by the information they choose to pay attention to or what information is salient. Consumption decisions out of capital gains are no exception. We use account-level information from a leading mobile payment platform in China to understand how individuals' spending responds to investments' capital gains that are more or less salient. We follow Kaniel and Parham (2017), who show that mutual funds displayed on WSJ Category Kings solicit media attention and investment flows, Agarwal et al. (2020), who show that individuals chase mutual fund returns and forego consumption to do so, Loos et al. (2020), who link sales of investments and spending, but without direct variation in attention, and Gargano and Rossi (2018), who look at how attention affects investment performance.

The recent micro- and macroeconomics literature has emphasized the heterogeneity in marginal propensities to consume (MPC) across economic agents to understand the distributional effects of aggregate fiscal and monetary shocks. Behavioral research, such as the studies by Kahana (2012a) and Bordalo et al. (2012, 2013, 2020), emphasize two sources that lead to heterogeneity in paying attention: salience and memory. Salience pertains to the prominence of certain information or events, drawing investors' focus to the most noticeable aspects. Memory, on the other hand, plays a crucial role in shaping what information is readily available to investors, influencing their decision-making processes by highlighting past experiences and learned patterns. These factors contribute to selective attention, affecting how investors process information and make financial decisions.

In this paper, we utilize a novel dataset of 200,000 active investors in 2019 and 2020. Our data captures investors' holdings, trading, and spending. We show that monthly capital gains, unrealized and in- or excluding dividends, from funds that are listed at the top of the page, which are funds that the investor recently invested into, attract a larger consumption response than those from funds invested in the more distant past. In addition, capital gains from top-performing funds lead to greater consumption responses than proceeds from worse-performing funds. The heterogeneity in MPCs across investments that are more or less salient suggests that selective attention may render money non-fungible for investors.

While recency is likely more troubled by endogeneity concerns than the status as the top-performing fund, we go on to exploit two quasi-experimental settings that further support a causal interpretation of the above findings. First, the platform's default setting presents the fund that investors most recently acquired at the top of their fund holding page. Additionally, mutual funds from the same fund company as the fund recently bought, even if they were acquired a long time ago, are grouped in a single block. This rule introduces plausibly exogenous variation in the salience of funds that were from the same fund company as the fund recently bought and funds that were not. We then show that investors' consumption response is stronger to capital gains of the funds that were from the same fund company as the fund recently bought.

Second, we exploit a change in the platform's display settings. In July 2020, the platform introduced a change that allowed investors to customize the ordering of their holdings. While investors retain the option to adhere to the previous default setting based on the recency of the investments, after July 2020, they can sort their portfolio funds based on holding period performance instead. We then show that, after the change, the consumption response to proceeds from top-performing funds relative to worse-performing funds is more different.

To establish robustness, we first show similar results when we use capital gains and dividends as our variable measuring investment proceeds. We then show the consumption responses to cumulative capital gains (and dividends) as opposed to monthly capital gains (and dividends), as the platform displays investment outcomes in the form of cumulative proceeds. We then examine consumption in different categories (online versus offline spending). In all tests, we find qualitatively similar results.

The remainder of this paper is organized as follows. Section 2 presents a literature review. Section 3 describes the data and the institutional background. Section 4 presents the main results in this paper. Section 5 further shows the identification strategies and their corresponding results. Section 6 conducts several robustness checks to validate the findings. Section 7 discusses the results, and Section 8 concludes the paper.

2 Literature review

The behavioral finance literature has shown that retail investors pay more attention to capital gains rather than losses and explored the implications of selective attention for trading behavior (Karlsson et al., 2009; Golman et al., 2017; Olafsson and Pagel, 2017; Gargano and Rossi, 2018; Andries and Haddad, 2020; Quispe-Torreblanca et al., 2020, 2021; Birru et al., 2019). Despite this maturing literature, it remains an open question whether attention also affects investors' consumption and savings. In this paper, we follow Loos et al. (2020) who exploit a German tax reform that affected the displayed purchase prices in investors' online portfolios and document that individuals sell "fictitious" winners, i.e., losers with respect to the original purchase price, displayed as winners after the reform and that investors increase their consumption in response to such liquidations. While Loos et al. (2020) focus on the change in displayed

purchase prices, we focus more directly on changes in the ordering of funds in investors' portfolios that induce changes in attention. After all, a range of studies in behavioral economics/finance and psychology document top-of-the-list effects (see, e.g., Kaniel and Parham, 2017).

Our study demonstrates that behavioral biases in trading impact individual consumption of mutual funds' capital gains and dividends. Since stock market wealth constitutes a significant portion of household net worth (about one-quarter) and consumption represents the largest component of GDP (Campbell, 2006; Poterba, 2000; Di Maggio et al., 2020), understanding the relationship between attention in investing and consumption is important. Additionally, our results establish that behavioral biases in trading directly affect utility through consumption rather than only indirectly through wealth. There exists a small literature on investors as consumers showing that advertising products to investors increases demand for the corresponding stocks (Lou, 2014), company earnings announcements generate retail foot traffic (Noh et al., 2021), and individual stock ownership increases spending at the corresponding companies' stores (Medina et al., 2021).

We also contribute to the literature on consumption out of stock market wealth, which includes studies employing aggregate and regional variation (e.g., Davis and Palumbo (2001), Dynan and Maki (2001), and Case et al. (2005)).[1] There also exist studies employing household-level data. Baker et al. (2007) use CEX data and show that withdrawals that are likely used for consumption respond strongly to changes in dividend payments but not to changes in stock prices. They also provide suggestive evidence that this behavior is driven by mental accounting. Furthermore, Di Maggio et al. (2020) obtain the same findings using annual household consumption and asset holdings data from the Swedish wealth registry. We also contribute to a recent literature

[1]See Poterba (2000) for a survey of the literature.

looking into how expectations and attention are related to the macroeconomy Coibion and Gorodnichenko (2015); Link et al. (2023). Finally, our paper contributes to the literature examining the link between capital gains, cash flows, consumer sentiment, and consumption (Parker, 1999, 2015; Agarwal et al., 2007; Jappelli and Pistaferri, 2010; Olafsson and Pagel, 2018; Meyer et al., 2018; Gillitzer and Prasad, 2018) and relates to the extensive literature on household consumption in response to income and cash-flow shocks, such as Johnson et al. (2006), Agarwal and Qian (2014), Olafsson and Pagel (2018), Jappelli and Pistaferri (2014), Jappelli and Pistaferri (2000), among others.

3 Data and Institutional Background

We obtained our data from Alipay, which is a third-party mobile and online payment platform established by Alibaba Group in 2004. In 2013, Alipay overtook PayPal as the world's largest mobile (digital) payment platform. As of June 2020, Alipay serves over 1.3 billion users and 80 million merchants (Hong Kong Exchange News, October 20, 2020). By the fourth quarter of 2018, Alipay had approximately 55% share of the third-party payment market in mainland China. Along with WeChat, Alipay has been described as China's super-app with a wide range of functionalities, including ride-sharing, travel booking, medical appointments, and, more relevantly, mutual fund investing. In terms of mutual fund types, Alipay's investment platform (Ant Fortune) carries diverse fund asset classes, including money market, bond, mixed, equity, index, Qualified Domestic Institutional Investor (QDII), and gold funds.

Some Alipay users allocate only a very modest amount in mutual funds, resulting in limited capital gains. Thus, we restrict the sampling of investors to Alipay users who had a total mutual fund holding amount exceeding 10,000 RMB at the outset of 2019.

We then randomly selected 200,000 users from this group of investors from January 2019 to December 2020. We collected data on investors' characteristics, monthly mutual fund investments, and monthly consumption for these investors. To address the concern that hyperactive investors may have short attention spans and thus under-react to monthly capital gains, we, throughout our main analysis, drop investors whose trading frequency is among the top 10% of our sample investors.[2] We provide robustness tests using the full random sample of investors in Internet Appendix Tables B1 ad B2. Variables are winsorized at the 0.5 and 99.5 percentiles.

The data on investors' characteristics includes their gender, resident city, age, and whether they work in their resident city. We also obtain information about investors' self-reported "risk level" obtained from surveys as required by the China Securities Regulatory Commission (CSRC). According to Panel A in Table 1, we have 61% male investors, with an average age of 38 and self-reported risk level of 3 out of a 0 to 5 range.[3]

[Insert Table 1]

For consumption activities, we obtain the monthly consumption value made through Alipay, which can be further divided into consumption made on Taobao (an online shopping platform operated by Alibaba) or not. Taobao consumption is further categorized in two ways: by type–into "Service payment," "Durable payment," and "Non-durable payment"–or by purpose–into "Basic payment," "Development payment," and "Leisure payment." Non-Taobao consumption does not distinguish between different consumption categories.

[2]Appendix Figure B1 shows that the top 10% active investors have an average trading frequency (around 120 times per month) four times that of the top 20% decile, which in turn is about 2 times that of the top 30% decile. This is not caused by most active investors being disproportionally wealthier, as shown by Figure B2.

[3]Based upon a series of questions regarding investment choices and attitudes, the system will assess each investor's risk level scaled from 0 to 5, with 0 indicating the highest level of risk aversion and 5 indicating the lowest.

According to Panel B in Table 1, the average monthly spending is about 6,525 RMB, with Taobao spending of 1,559 RMB and non-Taobao spending of 4,883 RMB.[4]

Regarding mutual fund investment activities, we obtain detailed purchase and redemption transactions made by each investor each month for each product on the Ant Fortune investment platform. We also obtain the detailed monthly product-level holding and capital gains. For our study, we focus primarily on unrealized capital gains as well as unrealized capital gains plus dividends. Here, dividends from actively managed mutual funds are discretionary payments from the mutual fund management. In contrast, dividends from index funds can be viewed as a pass-through of dividends from stocks at a predetermined frequency.

As shown in Panel C of Table 1, the average mutual fund holding is 82,820 RMB, with a median of 36,512 RMB. The average monthly net flow is 21,069 RMB, while the median is 1,400 RMB. On average, each user holds about 8 funds per month, with a median of 6. We classify these funds into top-performing and other funds based on their cumulative returns each month. Panel C indicates that the average monthly capital gains for top-performing funds are 671 RMB (or 706 RMB when including dividends), while the combined capital gains for other, worse-performing funds average 901 RMB (or 960 RMB with dividends). When categorizing funds based on the timing of investments, we find that recent investments, made within the past month, yield an average monthly capital gain of 522 RMB (or 558 RMB with dividends). For earlier investments, the average monthly capital gain is 1,038 RMB (or 1,096 RMB when dividends are included).

This study was remotely conducted on the Ant Open Research Laboratory in an Ant Group Environment. All data was sampled, desensitized, and analyzed on the Ant Open Research Laboratory. The laboratory is a sandbox environment where the

[4]We omit the starting month of the sample (i.e., January 2019) when reporting the summary statistics as it is not used in the regression analysis due to the lagged construction of regressors.

authors can only remotely conduct empirical analysis, and individual observations are invisible. The main regression variables include basic variables, investment variables, and consumption variables.

4 Main Results

4.1 Recently Acquired Funds

To test whether capital gains from recently invested funds attract more attention and drive higher consumption, we divide capital gains into two distinct components for each investor and each month: (1) recent investments made within the prior month and (2) investments made earlier than the previous month. We then aggregate capital gains separately for each type of fund and analyze the response of total consumption to the capital gains of the two types in the subsequent month. To do so, we employ the following two regression models:

$$\begin{aligned} Consumption_{i,t} = \alpha + \beta_1\ CG_{i,t-1} \times Recent_{i,t-1} +\ \beta_2\ CG_{i,t-1} + \beta_3 Recent_{i,t-1} \\ + Controls + \epsilon_{i,t} \end{aligned} \tag{1a}$$

$$\begin{aligned} Consumption_{i,t} = \alpha + \beta_1\ (CG + Div)_{i,t-1} \times Recent_{i,t-1} +\ \beta_2\ (CG + Div)_{i,t-1} \\ + \beta_3 Recent_{i,t-1} + Controls + \epsilon_{i,t} \end{aligned} \tag{1b}$$

where $Consumption_{i,t}$ is total consumption spent by investor i in month t, $CG_{i,t-1}$ stands for capital gains/losses for investor i in month $t-1$, $Recent_{i,t-1}$ denotes the fraction of capital gain generated from the mutual funds purchased by investor i in the past month $t-1$. If the investors purchase a fund multiple times, we consider the most recent purchase time. Similarly, in the second equation, we define total gains as the sum of capital gains and dividends, $(CG + Div)_{i,t-1}$. We also control for the total

amount of mutual funds held and the number of funds held. Investor and year-month fixed effects are included in all specifications.

[Insert Table 2]

Table 2 presents our regression analyses, revealing a noteworthy distinction in the consumption response to proceeds from recent versus earlier investments. As demonstrated in column (2) with all controls, a 100 RMB increase in capital gains from recent investments results in a 1.60 RMB increase in consumption in the subsequent month, of which 0.60 RMB represents the additional increase beyond the consumption response to overall portfolio capital gains. Conversely, a 100 RMB increase in capital gains from earlier investments yields only 1.00 RMB additional consumption. We find similar patterns when considering total proceeds that also include dividends in columns (3) and (4). Specifically, column (4) shows that a 100 RMB increase in total proceeds from recent investments leads to a 1.62 RMB increase in consumption the following month, in which 0.67 RMB is the incremental increase.

Overall, we find that MPC out of capital gains of recently invested mutual funds is greater than that of an earlier investment. In the context of our study, the default display mode of mutual funds held by investors is by investment time, with the most recently acquired fund occupying the top, salient position. This display arrangement naturally encourages investors to allocate greater attention to the funds they have most recently purchased.

4.2 Top-performing Funds

In this subsection, we explore selective attention paid to the top-performing funds within investors' portfolios and investigate whether proceeds from these funds cause greater consumption responses. To determine the top-performing fund, we rank all the

funds held by an investor each month by their cumulative returns. The top-performing fund is determined as the one with the highest cumulative return. We also employ two regression models with a similar structure as Equations (1a) and (1b):

$$\begin{aligned} Consumption_{i,t} = \alpha + \beta_1\ CG_{i,t-1} \times Top_{i,t-1} + \ \beta_2\ CG_{i,t-1} + \beta_3 Top_{i,t-1} \\ + Controls + \epsilon_{i,t} \end{aligned} \tag{2a}$$

$$\begin{aligned} Consumption_{i,t} = \alpha + \beta_1\ (CG + Div)_{i,t-1} \times Top_{i,t-1} + \beta_2 (CG + Div)_{i,t-1} \\ + \beta_3 Top_{i,t-1} + Controls + \epsilon_{i,t}, \end{aligned} \tag{2b}$$

where $Top_{i,t-1}$ stands for the fraction of capital gains from the top-performing fund of investor i in month t. The construction of other variables follows Equations (1a) and (1b).

[Insert Table 3]

Table 3 presents the results. We find that consumption responds more to proceeds generated by top-performing funds than to other funds. Column (1) shows that a 100 RMB capital gain from top-performing funds leads to a 3.27 RMB increase in consumption next month, in which 2.28 RMB is the incremental increase on top of the response to overall portfolio capital gains. In contrast, the same magnitude of increase in capital gain from other funds results in merely 0.99 RMB additional consumption. In column (2), after accounting for factors such as holdings and the number of funds held by individual investors, we still find a pronounced difference in consumption sensitivity. This pattern remains consistent when considering total proceeds, including both capital gains and dividends, as shown in columns (3) and (4). For example, according to column (3), a 100 RMB increase in total proceeds from top-performing funds leads to an additional 3.23 RMB in consumption, in which 2.25 RMB increase is the incre-

mental increase. We find a similar gap between the two coefficients after accounting for holdings and the number of funds held by individual investors.

To summarize, we find that gains from investments that likely attract greater investor attention generate a greater MPC than other funds do, suggesting selective attention in causing the heterogeneity in MPC across invested assets and over time series.

5 Identification

In the previous section, we interpret the recency and the top performer effects as investors' selective attention, causing varying consumption responses. Such an interpretation, however, could be confounded by other factors. For example, investor sentiment may cause them to invest and consume simultaneously. In this section, we exploit two quasi-experimental settings associated with the display rules of the fund holding page on the Ant Fortune platform to provide causal evidence for our interpretation.

5.1 Group-based Display Rule

During our sample period, the group-based display rule on Ant Fortune presents the fund that investors most recently acquired at the top of their fund holding page. Additionally, funds from the same fund company are grouped in a single block. This unique display rule introduces plausibly exogenous cross-sectional variations in attention paid to earlier invested funds under each investor's portfolio. To illustrate this rule, suppose an investor holds three funds: A, B, and C. A is purchased by the investor most recently in the last month. B and C were purchased before A at some time before last month. Suppose the same fund company issues A and C. According to the group-based display rule, after the investor purchases A, A will be exhibited on top of the investor's

fund holding page, and C will be exhibited below it. Finally, B will be shown below C. We consider fund C here to be an earlier investment that garnered greater attention than B due to the display rule.

Following a regression specification akin to Equations (1a) and (1b), we explore how total consumption reacts to earlier capital gains with high attention versus low attention while controlling for capital gains from recent investment. If our hypothesis holds —that their attention to capital gains influences investors' MPC, anticipate observing a stronger MPC stemming from earlier investments with great attention than from earlier investments with low attention. We report our analysis in Table 4. Variable $Samefirm$ is a dummy variable indicating capital gains generated by funds invested earlier and belonging to the same fund company as recently invested funds.

[Insert Table 4]

Across all columns, we find evidence supporting our conjecture. According to Column (2), a 100 RMB increase in proceeds from earlier investments attracting high attention results in an additional consumption of 2.14 RMB in the subsequent month on top of the response to overall portfolio gains, whereas an equivalent amount of capital gain from earlier investments with low attention yields only 0.26 RMB additional consumption. When we consider investors' consumption response to total proceeds, also including dividends, Column (4) shows MPCs of 2.10% and 0.26% for high and low-attention funds, respectively.

Thus, our findings based on the group-display rule suggest the role of selective attention in creating heterogeneity in MPCs across different investments by individuals.

5.2 Display Enabling Discretion in Sorting Holding Funds

Before July 2020, mutual funds held by investors were arranged based on the order of purchase, as explained in the preceding section. However, in July 2020, Alipay introduced a change that allows investors to customize the ranking of their holding funds. While investors can retain the option to adhere to the previous default setting, they were also granted the discretion to sort their portfolio funds according to holding period cumulative returns, daily returns, holding period cumulative proceeds, daily, or the timing of NAV information updates for each fund. Investors could sort their portfolio according to one of these standards in either ascending (default) or descending order, providing them with greater flexibility.

We hypothesize that following the adoption of the policy, some investors will be inclined to sort their funds in accordance with their individual preferences. Considering that holding period return is a metric of particular interest to investors, we anticipate that, after the policy change, investors will be more prone to closely monitor the precise returns generated by their top-performing fund. Consequently, in comparison to other funds, the proceeds from the top-performing fund are expected to result in greater consumption.

To account for the incremental impact of top-performing and other investments subsequent to the change in the display setting, we construct a dummy variable $After$, which is equal to one if the month is July 2020 or after and zero otherwise. We include two interaction terms, *Capital gains* $\times$ *Top performer* $\times$ *After* and *Capital gains*$\times$ *After*, in the regression specifications in Equation (2a) and (2b). If our hypothesis holds, we anticipate that the coefficient for *Capital gains* $\times$ *Top performer* $\times$ *After* should be positive. Table 5 presents the results.

[Insert Table 5]

The findings presented in Table 5 align closely with our hypothesis. For example, Column (1) shows that prior to July 2020, a 100 RMB gain from the top-performing fund led to just a 0.42 RMB increase in consumption on top of the response to overall portfolio capital gains as opposed to 0.48 RMB for other funds. Following the change in display settings, a 100 RMB gain from the top-performing fund results in a 3.92 RMB increase in consumption than before. This finding implies that the top performer effect highlighted in Table 3 primarily emerges after the change in display settings that induced some investors to allocate their attention to the best-performing funds.

In contrast, for other funds, although there is also an enhancement in consumption response, the difference is only 0.83 RMB, representing just one-fifth of the corresponding increase observed for top-performing funds (3.92 RMB) after the policy change. A similar pattern emerges when examining the effect of total proceeds on consumption, as shown in Columns (3) and (4).

In summary, the results from both settings confirm our initial hypothesis that the proceeds of funds that garner more attention from investors cause greater MPCs.

6 Further Analyses

6.1 Heterogeneous Effects: Attention Constrainedness

Investors could hold multiple funds at the same time, which may limit investors' attention allocated to each fund. We conjecture that investors' differential consumption responses to capital gains of recent and top-performing funds versus other funds should be stronger among more attention-constrained investors. We test this idea in Table 6.

[Insert Table 6]

We proxy investors' attention constrainedness with the number of funds they hold.

We separate the sample into two subsamples based on the number of funds held in the first month of the sample above or below the median (5 funds), and present the results for investors holding at least 6 funds in columns (1) and (3) and for those holding at most 5 funds in columns (2) and (4). We run the baseline specifications of Equations (2a) and (2b) for the recency and top-performing effects in Panels A and B, respectively.

Panel A indicates that the distinction in the consumption responses to proceeds from recent versus earlier investments mainly exists among investors who hold more funds. Consistently, Panel A shows that the distinction in the consumption responses to proceeds from top-performing versus other investments mainly exists among more attention-constrained investors. Thus, our findings further confirm the effect of attention in creating heterogeneous responses in consumption across different investments.

6.2 Consumption Response to Cumulative Capital Gains

Trading apps like Alipay commonly display investment performance as cumulative proceeds rather than just focusing on returns from the last month or the last three months. In this section, we further investigate the recency effect and the top-performer effect based on cumulative performance.

[Insert Table 7]

As shown in Panel A of Table 7, investors respond to both cumulative proceeds from recently invested and earlier invested funds. Still, the effect from recent investments is approximately twice as large as the effect from earlier investments. For the top-performer effect, Panel B shows that the consumption response to the cumulative proceeds of top-performing funds is approximately three to four times as big as that of proceeds from other funds. We, however, note that the coefficients reported in Table

7 cannot be interpreted directly as MPCs, as the constructions of consumption and capital gains are not at the same frequency of monthly flows.

6.3 Gains versus Losses

In this subsection, we explicitly distinguish gains and losses and further test whether there is any asymmetric consumption response to investment gains versus losses.

[Insert Table 8]

As illustrated in Table 8, investors demonstrate varying responses to gains versus losses with respect to the recency and top-performing effects. Specifically, as shown in the recency effect analysis in Columns (1) and (2), investors tend to react more strongly to *gains* from both high-attention and low-attention funds compared to *losses* from the same funds. In Column (1), the response to gains from high-attention funds is 1.81 cents per RMB relative to losses, whereas the response to gains from low-attention funds is only 0.56 cents per RMB relative to losses. In the top-performing effect analysis shown in Columns (3) and (4), investors exhibit a stronger response to gains from top-performing funds, with a response rate of 6.98 to 6.32 cents per RMB higher than their response to losses from these funds. In summary, investors show a more pronounced reaction to gains than to losses, with this tendency being especially pronounced for high-attention funds.

6.4 Taobao Consumption versus Non-Taobao Consumption

Our data on each user's monthly consumption is categorized into Taobao consumption and non-Taobao consumption. Taobao consumption includes all spending on Taobao, a leading online shopping platform in China owned by Alibaba, the same parent company as Alipay. Non-Taobao consumption covers a wide range of activities outside Taobao,

such as QR code payments at local stores. In this section, we analyze consumption on Taobao versus non-Taobao sources to determine whether the recency and top performer effects differ across these categories. The results are presented in Panel A and Panel B of Table 9.

[Insert Table 9]

The recency effect on Taobao versus non-Taobao consumption is consistent with our previous finding based on total consumption. As shown in Columns (1) and (2) of Panel A, the response to earlier capital gains for Taobao consumption is 0.17 cents per RMB, compared to 0.16 cents per RMB for recent capital gains. Columns (3) and (4) in Panel A in Table 9 show that a 1 RMB gain from the recently invested fund leads to 1.40 to 1.41 cents additional non-Taobao consumption compared to the magnitude of 0.83 to 0.79 cents for earlier invested funds. The smaller coefficients observed in Columns (1) and (2) compared to Columns (3) and (4) is partly due to Taobao consumption representing only about 20% of total consumption in our sample period.

Regarding the top-performing effect on Taobao versus non-Taobao consumption, Panel B in Table 9 shows that the top-performer effect is evident for both types of consumption. For Taobao consumption, the response to top-performing funds is 0.33 cents per RMB, compared to 0.10 cents per RMB for other capital gains. For non-Taobao consumption, the response to top-performing funds ranges from 1.94 to 1.97 cents per RMB, while the response to other capital gains is 0.58 to 0.60 cents per RMB. Similar to the recency effect, the response is much stronger in non-Taobao consumption.

Overall, limited attention leads to varying consumption responses to capital gains mainly through the offline channel. Notably, the effect of attention extends beyond just impulse purchases made through online shopping.

6.5 Robustness Tests

In this subsection, we include the full randomly selected sample (not dropping the most active 10% investors) and repeat the analysis in Tables 3 and 4. We report our analysis in Internet Appendix Tables B1 and B2. We show that our findings are robust to including even the most active investors, with slightly smaller magnitude. For example, Column (2) of Table B1 shows that a 100 RMB increase in capital gains from earlier investments attracting high attention results in an additional consumption of 1.71 RMB in the subsequent month on top of the response to overall portfolio gainsïijŇthe corresponding magnitude without most active investors is 2.14 RMB as shown in Table 3.

7 Discussion

We start our discussion by reviewing what a standard portfolio choice model would predict in terms of the consumption response to capital gains. In a standard portfolio choice model with CRRA utility and multiple risky assets (see, e.g., Merton, 1969; Campbell and Viceira, 2002, and outlined in Internet Appendix A) an additional unit of wealth brings a proportional response in additional consumption. This proportional response equals the consumption-wealth ratio, which we denote as ρ, and which is independent of attention. For the log utility case, the consumption-wealth ratio boils down to $\rho = 1 - \beta$ with β denoting the agent's discount factor. If we, for example, take the point estimate for the annual discount factor in Gourinchas and Parker (2001) scaled to a monthly period, we have $\beta = 0.9569^{1/12} = 0.9963$. In this case, the proportional consumption response would equal $\rho = 0.0036$. Now, suppose instead of one risky asset, we have many, then one unit of additional returns will translate to consumption at an even lower level, e.g., when the allocation to each risky asset is 10%, we will

obtain a proportional consumption response of approximately 0.0036*0.1=0.036%. We thus first observe that our estimated consumption response is a magnitude larger and varies with attention, two findings that go beyond standard portfolio theory.

We established that investors exhibit heightened sensitivity to the proceeds generated by funds they pay more attention to and that they will respond more to these proceeds in terms of their consumption. To gauge investor selective attention, we employed two proxies: the recency of their investments and the performance ranking of funds within their investment portfolios. We now review the existing literature in economics and finance that made us choose these two proxies for attention.

In terms of recency, insights from the field of psychology regarding memory indicate that individuals tend to give more weight to recent experiences (Kahana, 2012b). In a financial market context, Jiang et al. (2023) have documented that investors tend to recall their recent experiences in exercises like free recall. As investors are subject to limited attention capacity, they are more likely to allocate more attention to investments made more recently and, consequently, possess greater awareness of performance associated with more recent investments. Hence, we find that MPC, out of proceeds from a recently invested mutual fund, can have a more pronounced effect than an investment made in the more distant past.

In the field of economics, a recent literature pioneered by Bordalo et al. (2020) look at the interplay between memory and attention. Here, the authors also posit that more recent experiences are overweighted relative to previous ones.

That said, our recency findings are subject to endogeneity concerns. Our finding that capital gains from funds grouped with those in which investors recently invested elicit a larger consumption response is evidence that salience matters.

In terms of performance, it is widely acknowledged in the psychology literature that extreme ranks are inherently salient and captivating and play a pivotal role in decision-

making (see Diecidue and Wakker (2001) and Wakker (2010) for a comprehensive literature review). In the economics literature, rank-dependent utility models, such as cumulative prospect theory introduced by Tversky and Kahneman (1992), propose that the order in which payoffs are ranked significantly affects their perceived importance. Additionally, recent literature has looked at how salience affects choice. In Bordalo et al. (2012), the salience of a potential gamble the decision-maker may or may not take depends on how different its payoffs are.

Our findings with respect to the different categories of consumption suggest that limited attention creates both online and offline varying consumption responses to capital gains. They further imply that the attention effect is not limited to impulse purchases such as online shopping.

8 Conclusion

This paper contributes to the expanding literature on the heterogeneity in the marginal propensity to consume (MPC) across economic agents by focusing on the impact of limited attention. Our findings reveal that individuals' limited attention to their investments' capital gains significantly influences their consumption responses. Contrary to the common view that money is fungible, the heterogeneity in MPCs suggests that limited attention renders money non-fungible for investors. We use variation in attention based on recency and top performers and show that monthly investment proceeds from recently invested funds and top-performing funds attract larger consumption responses.

We then further support the causal interpretation of these findings using two quasi-experiments. First, we show that variations in the platform's display settings create exogenous differences in the attention given to various funds, with those attracting more

attention leading to a greater consumption response. Additionally, we use a change in the platform's display settings that allowed investors to customize the ordering of their holdings according to performance. In a before-after DiD setting, we show larger consumption responses to proceeds from top-performing funds compared to worse-performing funds after the change.

Overall, this research sheds light on the intricate relationship between attention, investment decisions, and consumption behavior, providing valuable insights for both academics and practitioners in the field of economics and finance.

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Table 1: **Summary Statistics**

This table reports the descriptive statistics of 180,000 Alipay users with 4,136,148 investor-month observations (mean, standard deviation, minimum, median, and maximum) for personal characteristics variables in Panel A, total and categorical consumption in Panel B, investment-related variables including holdings, net flow, number of funds, capital gains, and dividends in Panel C. Top performer is the share of capital gains (plus dividends) of the top-performing fund in the previous month and Recent is the share of capital gains (plus dividends) of the funds that were invested-into in the previous month. All continuous variables are winsorized at 0.005 level on both tails.

	N	mean	std	min	Median	max
Panel A. Personal Characteristics						
Age	180000	37.796	8.822	20	36	85
Gender 1=Male, 2=Female	180000	1.391	0.488	1	1	2
Risk Attitude(risk level 1-5)	179992	3.07	2.052	0	3	5
Panel B. Consumption						
Total Consumption (RMB)	4136968	6525	12429	0	2678	105201
Taobao	4136968	1559	3441	0	396	28735
Non-Taobao	4136968	4883	10718	0	1597	93612
Panel C. Investment						
Holding	4136148	82820	138822	0	36512	1060228
Net Flow	4136148	21069	60329	0	1400	520408
# of funds by each user	4136148	8.06	8.04	0	6	52
Capital gains of top performing funds	4136148	671	2383	-6322	71	19017
Capital gains of other funds	4136148	901	4445	-18367	72	32890
Capital gains+dividend of top performing funds	4136148	706	2451	-6230	78	19652
Capital gains+dividends of other funds	4136148	960	4503	-18090	90	33508
Capital gains of last month investment	4136968	522	3010	-12207	0	23010
Capital gains of earlier investment	4136968	1038	4253	-13897	72	34127
Capital gains+dividends of last month investment	4136968	558	3065	-12000	0	23622
Capital gains+dividends of earlier investment	4136968	1096	4332	-13667	875	34843

Table 2: **The Recency Effect**

This table presents the results for the baseline regression models (1a) and (1b) about the recency effect with total consumption as the dependent variable. The independent variables of interest in Column (1) (Column (2)) are *Capital gains* (+*dividends*) in the previous month and *Recent*, defined as the proportion of these capital gains (plus dividends) attributable to funds invested in the previous month. Control variables include total fund holdings and number of funds held in the portfolio in the previous month. Robust standard errors are clustered at the account level. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively.

Dep. Var.: Total Consumption	(1)	(2)	(3)	(4)
Capital gains × Recent	0.0046	0.0060*		
	(0.0031)	(0.0031)		
Capital gains	0.0165***	0.0100***		
	(0.0018)	(0.0018)		
Recent	-15.814	-15.962		
	(11.088)	(11.507)		
(Capital gains+dividends) × Recent			0.0054*	0.0067**
			(0.0030)	(0.0030)
Capital gains+dividends			0.0161***	0.0095***
			(0.0017)	(0.0017)
Recent			-17.675	-17.872
			(11.761)	(12.204)
Holdings		0.0017***		0.0017***
		(0.0002)		(0.0002)
# funds		1533.5***		1532.5***
		(200.74)		(200.74)
Account FE	Y	Y	Y	Y
Year-Month FE	Y	Y	Y	Y
R-squared	8.06E-05	0.0003	8.46E-05	0.0003
N	4136986	4136986	4136986	4136986

Table 3: **The Top Performer Effect**

This table presents the results for the regression models (2a) and (2b) about the top-performer effect with total consumption as the dependent variable. The independent variables of interest in Column (1) (Column (2)) are *Capital gains* (+*dividends*) in the previous month and $Top\ performer$, defined as the share of those from the top-performing fund. Control variables include total fund holdings and number of funds held in the portfolio. Robust standard errors are clustered at the account level. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively.

Dep. Var.: Total Consumption	(1)	(2)	(3)	(4)
Capital gains × Top performer	0.0228***	0.0177***		
	(0.0046)	(0.0046)		
Capital gains	0.0099***	0.0061***		
	(0.0018)	(0.0018)		
Top performer	-18.956**	-19.063**		
	(8.2274)	(8.5667)		
(Capital gains+dividends) × Top performer			0.0225***	0.0181***
			(0.0045)	(0.0045)
Capital gains+dividends			0.0098***	0.0057***
			(0.0017)	(0.0017)
Top performer			-18.211**	-18.344**
			(8.3968)	(8.7385)
Holdings		0.0016***		0.0016***
		(0.0002)		(0.0002)
# funds		1496.4***		1498.2***
		(200.64)		(200.64)
Account FE	Y	Y	Y	Y
Year-Month FE	Y	Y	Y	Y
R-squared	0.0000918	0.0003	0.00009338	0.0003
N	4136148	4136148	4136148	4136148

Table 4: **The Grouping Effect for Funds of the Same Firm as the Recently Invested Into**

This table presents the results for consumption responses to gains from funds with high attention versus low attention by exploring a group-based display rule on the platform. The dependent variable is total consumption. The independent variables of interest in Columns (1) and (2) (Columns (3) and (4)) are *Capital gains* (+*dividends*) in the previous month, *Recent*, defined as the proportion of these capital gains (plus dividends) attributable to funds invested in the previous month, and *Same firm*, defined as the share of those capital gains (plus dividends) from invested funds that are in the same fund company as the funds invested in the previous month. Control variables include total fund holdings and number of funds held in the portfolio. Robust standard errors are clustered at the account level. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively.

Dep. Var.: Total Consumption	(1)	(2)	(3)	(4)
Capital gains × Recent	0.0150***	0.0119***		
	(0.0028)	(0.0028)		
Capital gains × (1-Recent) × Same firm	0.0503***	0.0214**		
	(0.0108)	(0.0108)		
Capital gains	0.0035***	0.0026**		
	(0.0011)	(0.0010)		
Recent	-20.978***	-21.387***		
	(6.1684)	(6.3188)		
Recent × Same firm	-34.763***	-36.354***		
	(12.957)	(13.255)		
(Capital gains+dividends) × Recent			0.0154***	0.0121***
			(0.0027)	(0.0027)
(Capital gains+dividends) × (1-Recent) × Same firm			0.0497***	0.021**
			(0.0106)	(0.0115)
Capital gains+dividends			0.0036***	0.0026**
			(0.0010)	(0.0010)
Recent			-23.722***	-24.225***
			(5.1939)	(5.2607)
(1-Recent) × Same firm			-36.336***	-38.099***
			(11.086)	(11.242)
Holdings		0.0017***		0.0017***
		(0.0002)		(0.0002)
# funds		1525.5***		1524.3***
		(200.71)		(200.74)
Account FEs	Y	Y	Y	Y
Year-Month FEs	Y	Y	Y	Y
R-squared	6.99E-05	0.0003	7.32E-05	0.0003
N	4136963	4136963	4136963	4136963

Table 5: **The Top Performer Effect after the Change in Display Setting**

This table presents the results for the extended regression models from (2a) and (2b) about the top-performer effect after the change in display setting. The dependent variable is total consumption. The independent variables of interest in Columns (1) and (2) (Columns (3) and (4)) are *Capital gains* (+*dividends*) in the previous month, $Top\ performer$, defined as the share of those from the top-performing fund, and $After$, which is a dummy variable that equals 1 after the change in the display setting. Control variables include total fund holdings and number of funds held in the portfolio in the previous month. Robust standard errors are clustered at the account level. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively.

Dep. Var.: Total Consumption	(1)	(2)	(3)	(4)
Capital gains × Top performer	0.0042	0.0006		
	(0.0056)	(0.0056)		
Capital gains	0.0048**	0.0029		
	(0.0022)	(0.0022)		
Capital gains × Top performer × After	0.0392***	0.0373***		
	(0.0090)	(0.0090)		
Capital gains × After	0.0083**	0.0047		
	(0.0036)	(0.0036)		
Top performer	-11.001***	-10.687***		
	(3.8876)	(3.8953)		
Top performer × After	-20.202**	-21.276**		
	(8.4901)	(8.6614)		
(Capital gains+dividends) × Top performer			0.0058	0.0026
			(0.0055)	(0.0055)
Capital gains+dividends			0.0043**	0.0021
			(0.0022)	(0.0022)
(Capital gains+dividends) × Top performer × After			0.0347***	0.0335***
			(0.0088)	(0.0088)
(Capital gains+dividends) × After			0.0093***	0.0058
			(0.0035)	(0.0035)
Top performer			-8.9928***	-8.7362***
			(3.2489)	(3.2922)
Top performer× After			-23.868***	-24.874***
			(7.5494)	(7.7458)
Controls	Y	Y	Y	Y
Account FEs	Y	Y	Y	Y
Year-Month FEs	Y	Y	Y	Y
R-squared	0.0001	0.0003	0.0001	0.0003
N	4136148	4136148	4136148	4136148

Table 6: **Heterogeneity: Attention Constrainedness**

This table presents the heterogeneous effects of attention across investors with varying levels of attention constrainedness. We separate the sample into two subsamples based on the number of funds held in the first month of the sample above or below the median (5 funds), and present the results for investors holding at least 6 funds in columns (1) and (3) and for those holding at most 5 funds in columns (2) and (4). In Panel A, the independent variables of interest are *Capital gains* (+*dividends*) in the previous month and *Recent*, defined as the proportion of these capital gains (plus dividends) attributable to funds invested in the previous month. In Panel B, the independent variables of interest are *Capital gains* (+*dividends*) in the previous month and *Top performer*, defined as the share of those from the top-performing fund. Control variables include total fund holdings and number of funds held in the portfolio in the previous month. Robust standard errors are clustered at the account level. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively.

Dep. Var.: Total Consumption	(1)	(2)	(3)	(4)
	Most constrained	Least constrained	Most constrained	Least constrained
		Panel A: Recency		
Capital gains × Recent	0.0084*	0.0032		
	(0.0045)	(0.0042)		
Capital gains	0.0062**	0.0147***		
	(0.0024)	(0.0026)		
Recent	-15.87	-18.48		
	(11.974)	(24.788)		
(Capital gains+dividends) × Recent			0.0085*	0.0045
			(0.0044)	(0.0041)
Capital gains+dividends			0.0062**	0.0136***
			(0.0024)	(0.0025)
Recent			-18.455	-10.006
			(13.218)	(12.229)
R squared	0.0003	0.0003	0.0003	0.0003
N	1744859	2391673	1744859	2391673
		Panel B: Top performer		
Capital gains × Top performer	0.0224***	0.0119**		
	(0.0077)	(0.0059)		
Capital gains	0.0028*	0.0104***		
	(0.0025)	(0.0026)		
Top performer	-17.926*	-31.206		
	(9.3631)	(21.121)		
(Capital gains+dividends) × Top performer			0.0234***	0.0122**
			(0.0074)	(0.0058)
Capital gains+dividends			0.0026	0.0099***
			(0.0024)	(0.0026)
Top performer			-19.354**	-7.3575
			(9.3283)	(15.147)
R squared	0.0003	0.0003	0.0004	0.0003
N	1744700	2391013	1744700	2391013
Controls	Y	Y	Y	Y
Account FE	Y	Y	Y	Y
YearMonth FE	Y	Y	Y	Y

Table 7: **Consumption Response to Cumulative Investment Gains**

This table presents the results for the modified models using cumulative gains, instead of monthly gains as the variable of interest. In particular, Panel A shows the recency effect on consumption using the modified models similar to (1a) and (1b). Panel B shows the top-performer effect on consumption using the modified models similar to (2a) and (2b). The independent variables of interest are $Cum.\ CG\ (CG + Div) \times Recent$ in Panel A and $Cum.\ CG\ (CG + Div) \times Top\ Performer$ in Panel B. Recent represents the proportion of Cum. CG (CG+Div) attributable to funds invested in the previous month. Top Performer captures the share of Cum. CG (CG+Div) derived from the top-performing fund. Control variables include total fund holdings and the number of funds held in the portfolio in the prior month. Robust standard errors, clustered at the account level, are reported. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively.

Dep. Var.: Total Consumption	(1)	(2)	(3)	(4)
Panel A: Recency				
Cum. CG × Recent	0.0077***	0.0066***		
	(0.0012)	(0.0012)		
Cum. CG	0.0085***	0.0055***		
	(0.0007)	(0.0008)		
Recent	0.2815	0.3049		
	(0.2674)	(0.2645)		
(Cum. CG+Div) × Recent			0.0077***	0.0066***
			(0.0012)	(0.0012)
Cum. CG+Div			0.0085***	0.0055***
			(0.0007)	(0.0008)
Recent			0.1916	0.2152
			(0.2097)	(0.2077)
R squared	3.00E-04	4.00E-04	2.00E-04	5.00E-04
N	4136968	4136968	4596797	4596797
Panel B: Top-Performer				
Cum. CG × Top performer	0.0228***	0.0177***		
	(0.0046)	(0.0046)		
Cum. CG	0.0099***	0.0061***		
	(0.0018)	(0.0018)		
Top performer	-18.956**	-19.063**		
	(8.2274)	(8.5667)		
(Cum. CG+Div) × Top performer			0.0225***	0.0181***
			(0.0045)	(0.0045)
Cum. CG+Div			0.0098***	0.0057***
			(0.0017)	(0.0017)
Top performer			-18.211**	-18.344**
			(8.3968)	(8.7385)
R squared	0.0000918	0.0003	0.00009338	0.0003
N	4136148	4136148	4136148	4136148
Controls	N	Y	N	Y
Account FE	Y	Y	Y	Y
YearMonth FE	Y	Y	Y	Y

Table 8: **Consumption Response to Positive versus Negative Gains**

This table presents the results for heterogeneous consumption response to positive capital gains versus negative capital gains for the recency effect and the top-performer effect. In particular, the dependent variable is the total consumption. The independent variables of interest are CG ($CG+Div$) from high-attention funds (recently invested funds for the recency effect and top-performing funds for the top-performer effect) and CG ($CG+Div$) from low-attention funds (earlier invested funds for the recency effect and non-top-performing funds for the top-performer effect) and their respective interactions with a positive dummy, indicating whether the proceed is positive or not. Control variables include total fund holding and number of funds held in the portfolio. Robust standard errors are clustered at both the account level and year-month level are reported. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively.

Dep. Var.: Total Consumption	(1)	(2)	(3)	(4)
	The Recency Effect		The Top-Performer Effect	
CG × High attention	-0.0074		-0.0523***	
	(0.0072)		(0.0126)	
CG × High attention × Positive	0.0181**		0.0698***	
	(0.0090)		(0.0150)	
CG	0.0053		0.0046	
	(0.0042)		(0.0038)	
CG × Positive	0.0056		-0.0021	
	(0.0054)		(0.0051)	
High attention	-15.779		-2.6724	
	(11.477)		(3.9173)	
(CG+Div) × High attention		0.0033		-0.0475***
		(0.0059)		(0.0124)
(CG+Div) × High attention×Positive		0.0144*		0.0632***
		(0.0077)		(0.0146)
CG+Div		0.0011		0.0052
		(0.0012)		(0.0037)
(CG+Div) × Positive		0.0093***		-0.0028
		(0.0026)		(0.0049)
High attention		-17.765		-2.0138
		(12.215)		(3.8726)
Controls	Y	Y	Y	Y
Account FE	Y	Y	Y	Y
YearMonth FE	Y	Y	Y	Y
R squared	0.00003	0.00003	0.00001986	1.8E-05
N	4136963	4136963	4136207	4136207

Table 9: **Heterogeneous Effect on Taobao versus Non-Taobao Consumption**

This table presents the results for the regression models (1a) and (1b) about the recency effect on categorical consumption in Panel A and (2a) and (2b) about the top-performer effect on categorical consumption in Panel B. In particular, the dependent variable in Column (1) and (2) is *Taobao consumption* and the dependent variable in Column (3) and (4) is $non-Taobao\ consumption$. The independent variables of interest are CG $(CG + Div)$ from recently invested funds and CG $(CG + Div)$ from earlier invested funds in Panel A, and CG $(CG + Div)$ from top performing funds and CG $(CG + Div)$ from other invested funds in Panel B. Control variables include total fund holding and number of funds held in the portfolio. Robust standard errors are clustered at both the account level and year-month level are reported. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively.

Dep. Var.: Total Consumption	(1)	(2)	(3)	(4)
	Taobao consumption		Non-Taobao Consumption	
Panel A: The Recency Effect				
CG × Recent	0.0016**		0.0140***	
	(0.0006)		(0.0021)	
CG × (1-Recent)	0.0017***		0.0083***	
	(0.0004)		(0.0016)	
(CG+Div) × Recent		0.0017***		0.0141***
		(0.0006)		(0.0021)
(CG+Div) × (1-Recent)		0.0017***		0.0079***
		(0.0004)		(0.0015)
R squared	2.73E-05	2.73E-05	3.00E-04	3.00E-04
N	4136968	4136968	4136968	4136968
Panel B: The Top-Performer Effect				
CG × Top performer	0.0033***		0.0197***	
	(0.0008)		(0.0032)	
CG × (1-Top performer)	0.0010**		0.0060***	
	(0.0004)		(0.0016)	
(CG+Div) × Top performer		0.0033***		0.0194***
		(0.0008)		(0.0031)
(CG+Div) × (1-Top performer)		0.0010**		0.0058***
		(0.0004)		(0.0016)
R squared	2.94E-05	2.98E-05	3.00E-04	3.00E-04
N	4136148	4136148	4136148	4136148
Controls	Y	Y	Y	Y
Account FE	Y	Y	Y	Y
YearMonth FE	Y	Y	Y	Y

Internet Appendix

A Standard Portfolio Choice Model

In the following, we first lay out the backward induction solution procedure starting in period T for the finite-horizon setting and then move on to the infinite horizon.

A.1 Finite horizon

Consider a model as in Merton (1969), assume that returns are iid log-normally distributed $R_t = e^{r_t} \sim log - N(\mu_r, \sigma_r^2)$. The agent lives for $t = \{1, 2, ..., T\}$ periods. The maximization problem in period $T - i$ is

$$max\{E_{T-i}[u(C_{T-i}) + \beta V_{T-i+1}(W_{T-i+1})]\} \text{ subject to } W_{T-i+1} = (W_{T-i} - C_{T-t})R_{T-i+1}$$

and characterized by the following first-order condition:

$$\Rightarrow C^*_{T-i} = \frac{W_{T-i}}{1 + (\beta E_{T-i}[R^{1-\theta}_{T-i+1} Q^0_{T-i+1}])^{-\frac{1}{\theta}}} = W_{T-i}\rho_{T-i}$$

$$\text{with } Q^\tau_{T-i} = R^{1-\theta}_{T-i+\tau}\rho^{1-\theta}_{T-i+\tau} \prod_{j=1}^{\tau-1} R^{1-\theta}_{T-i+j}(1 - \rho_{T-i+j})^{1-\theta}$$

The value function is given by:

$$V_{T-i}(W_{T-i}) = u(W_{T-i})Q^0_{T-i}$$

$$Q^0_{T-i} = \rho^{1-\theta}_{T-i} + (1 - \rho_{T-i})^{1-\theta}\beta E_{T-i}[R^{1-\theta}_{T-i+1} Q^0_{T-i+1}])$$

Now with iid returns $\rho_{T-i} = \frac{1}{1+(\beta E_t[R^{1-\theta}_{t+1}])^{\frac{1}{\theta}} + ... + (\beta E_t[R^{1-\theta}_{t+1}])^{\frac{i}{\theta}}}$. Therefore, each period the agent consumes a constant fraction out of his wealth.

A.2 Infinite horizon

Let's move on to the $T \to \infty$ case which can be derived by taking the $T - i$ case to the limit or alternatively directly via the Bellman equation

$$V_t(W_t, C_t^{t-1}, C_{t+1}^{t-1}, ...) = max\{u(C_t) + \beta E_t[V_{t+1}(W_{t+1}, C_{t+1}^t, C_{t+2}^t ...)]\}$$

subject to the agent's budget constraint:

$$W_{t+1} = (W_t - C_t)R_t$$

Under CRRA utility, the first-order condition is then given by:

$$C_t^{-\theta} = (W_t - C_t)^{-\theta}\psi$$

The solution procedure follows a guess and verify approach. Guess that the solution has the following structure:

$$C_t^* = W_t\rho_t \text{ and } V_t(W_t) = u(W_t)Q_t^0$$

With ρ_t and Q_t^0 being iid, dependent on the realization of R_t only and independent of calender time or contemporaneous wealth W_t. The first-order condition can be derived under the guessed solution which then remains to be verified. Let's start with the left hand side, the derivative of the first part of the value function, consumption utility and gain-loss utility over contemporaneous consumption is given by:

$$\frac{\partial(u(C_t))}{\partial C_t} = C_t^{-\theta}$$

Under the guessed solution each future consumption level can be iterated to today's

consumption-savings decision:

$$C_{t+\tau} = W_{t+\tau}\rho_{t+\tau} = (W_t - C_t)R_{t+\tau}\rho_{t+\tau}\prod_{j=1}^{\tau-1} R_{t+j}(1-\rho_{t+j})$$

Moreover, note that for iid returns $E_t[R_{t+1}^{1-\theta}\rho_{t+1}^{1-\theta}] = E_t[R_{t+\tau}^{1-\theta}\rho_{t+\tau}^{1-\theta}]$ for any $\tau \geq 1$ thus the infinite sum in the value function simplifies considerably:

$$= E_t[R_{t+1}^{1-\theta}\rho_{t+1}^{1-\theta}]\sum_{\tau=1}^{\infty}\beta^{\tau}(E_t[R_{t+1}^{1-\theta}(1-\rho_{t+1})^{1-\theta}])^{\tau-1} = \frac{\beta E_t[R_{t+1}^{1-\theta}\rho_{t+1}^{1-\theta}]}{1-\beta E_t[R_{t+1}^{1-\theta}(1-\rho_{t+1})^{1-\theta}]} = Q$$

The second part in the first-order condition refers to the first derivative of the continuation value with respect to C_t. The marginal value of savings is given by:

$$\frac{d\beta V_{t+1}(W_{t+1})}{dC_t} = \frac{\partial u((W_t - C_t)R_{t+1})Q_{t+1}^0}{dC_t} = -(W_t - C_t)^{-\theta}\beta E_t[R_{t+1}^{1-\theta}Q_{t+1}^0]$$

Note that again for iid returns $\beta E_t[R_{t+1}^{1-\theta}Q_{t+1}^0] = \beta E_{t+\tau-1}[R_{t+\tau}^{1-\theta}Q_{t+\tau}^0] = \psi$ thus:

$$\psi = \beta E_t[R_{t+1}^{1-\theta}Q_{t+1}^0] = \beta E_t[R_{t+1}^{1-\theta}\rho_{t+1}^{1-\theta} + R_{t+1}^{1-\theta}(1-\rho_{t+1})^{1-\theta}\psi]$$

The expression left over in the first-order condition is given by:

$$(W_t - C_t)^{-\theta}\beta E_t[R_{t+1}^{1-\theta}Q_{t+1}^0] = (W_t - C_t)^{-\theta}\psi$$

Accordingly, ρ_t varies solely with the realization of R_t and is thus iid which verifies the guess about ρ_t:

$$C_t^* = \frac{W_t}{1 + (\frac{\psi + \gamma Q(\eta F(R_t) + \eta\lambda(1-F(R_t)))}{1+\eta F(R_t)+\eta\lambda(1-F(R_t))})^{\frac{1}{\theta}}} = W_t\rho_t$$

And the value function can be easily used to verify the guess about Q_t^0 being iid and

varying with the realization of R_t:

$$V_t(W_t) = u(W_t)Q_t^0 = u(W_t)(\rho_t^{1-\theta} + (1-\rho_t)^{1-\theta}\psi)$$

The three nonlinear equations for Q, ψ and ρ_t can be solved numerically: For any parameter combination the fixed point of Q, ψ and $\rho(Q,\psi)$, which gives out $\rho_t = \rho(R_t)$ for any R_t, can be found. The guess and verify procedure revealed a legal equilibrium.

Now, one may consider a return $R_t = R^f + (\tilde{R}_t - R^f)\alpha_{T-1}$ with $log(\tilde{R}_t) = r_t \sim N(r - \frac{\sigma_r^2}{2}, \sigma_r^2)$ and $R^f = e^{r^f}$, Campbell and Viceira (2002) show that a good approximation to the rate of return is

$$log(R_t) = r_t = r^f + \alpha_{T-1}\phi_t + \alpha_{t-1}\frac{\sigma_r^2}{2} - \alpha_{t-1}^2\frac{\sigma_r^2}{2} \text{ with } \phi_t \sim N(0,1).$$

As shown in Campbell and Viceira (2002), the optimal portfolio share for CRRA utility is then given by

$$\alpha_t = \frac{E_t[r_{t+1} - r^f]}{\theta\sigma_r^2}.$$

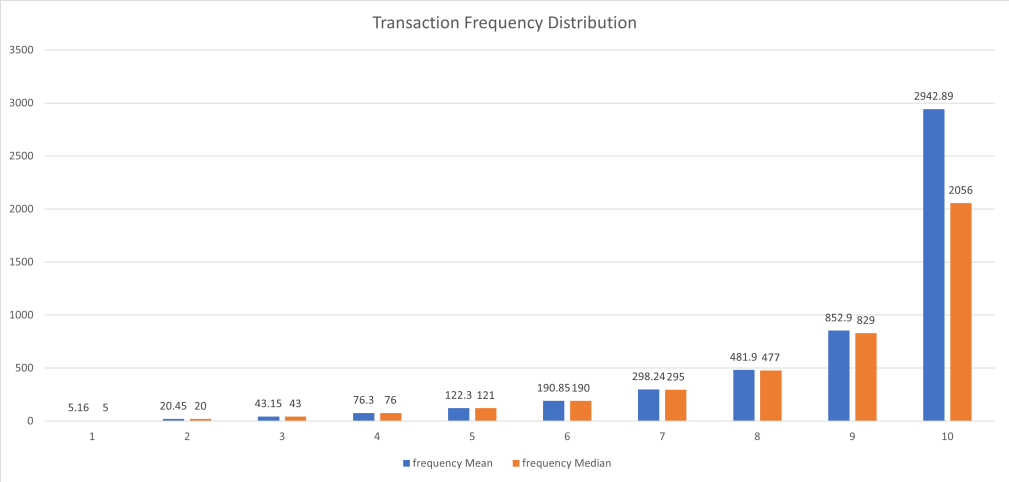
And in a model with many risky assets we have the vector

$$\boldsymbol{\alpha_t} = \frac{1}{\theta}\Sigma_t^{-1}E_t[r_{t+1} - r^f]$$

with the matrix Σ_t containing variances and covariances of excess returns.

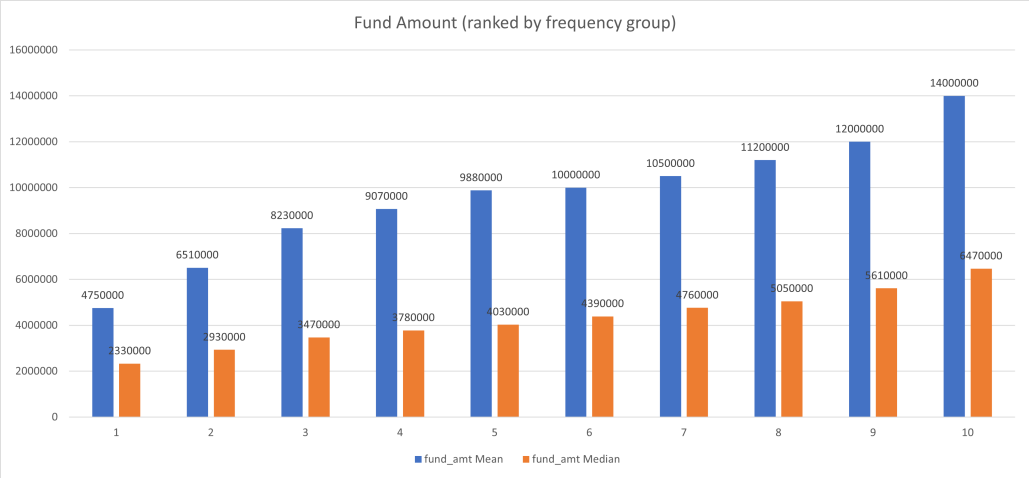
B Appendix Figure and Tables

Figure B1: Transaction Frequency Distribution



Notes: This graph shows the overall sample's transaction frequency distribution by deciles.

Figure B2: Fund Amount (Ranked by Transaction Frequency Group)



Notes: This graph shows the overall sample's mutual fund holding amount ranked by transaction frequencies in deciles.

Table B1: **Identification Test of the Recency Effect with Full Sample**

This table presents the results for consumption responses to gains from funds with high attention versus low attention by exploring a group-based display rule on the platform. It includes the top 10% most active investors. The dependent variable is total consumption. The independent variables of interest in Columns (1) and (2) (Columns (3) and (4)) are *Capital gains* (+*dividends*) in the previous month, *Recent*, defined as the proportion of these capital gains (plus dividends) attributable to funds invested in the previous month, and *Same firm*, defined as the share of those capital gains (plus dividends) from invested funds that are in the same fund company as the funds invested in the previous month. Control variables include total fund holdings and number of funds held in the portfolio. Robust standard errors are clustered at the account level. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively.

Dep. Var.: Total Consumption	(1)	(2)	(3)	(4)
CG×Recent	0.0133***	0.0101***		
	(0.0024)	(0.0024)		
CG×(1-Recent)×High Attention	0.0475***	0.0171*		
	(0.0094)	(0.0094)		
CG	0.0037***	0.0029***		
	(0.009)	(0.009)		
Recent CG/Total CG	-13.545*	-13.704		
	(8.1854)	(8.4549)		
(1-Recent)×High CG/Total CG	-8.4761	-9.1497		
	(13.631)	(14.11)		
(CG+Div)×Recent			0.0136***	0.0102***
			(0.0024)	(0.0024)
(CG+Div)×(1-Recent)×High Attention			0.0473***	0.017*
			(0.0093)	(0.0092)
CG+Div			0.0037***	0.0029***
			(0.0009)	(0.0009)
(Recent CG+Div)/(Total CG+Div)			-23.291***	-23.825***
			(4.8595)	(4.9159)
(1-Recent)×(High CG+Div)/(Total CG+Div)			-34.504***	-36.264***
			(9.9466)	(10.075)
Holding		0.0017***		0.0017***
		(0.0001)		(0.0001)
# funds		1535.7***		1534.7***
		(153.43)		(153.44)
Account FE	Y	Y	Y	Y
YearMonth FE	Y	Y	Y	Y
R squared	7.66E-05	0.0004	8.11E-05	0.0004
N	4596792	4596792	4596792	4596792

Table B2: **Identification Test of the Top-Performing Effect with Full Sample**

This table presents the results for the extended regression models from (2a) and (2b) about the top-performer effect after the change in display setting. The dependent variable is total consumption. It includes the top 10% most active investors. The independent variables of interest in Columns (1) and (2) (Columns (3) and (4)) are *Capital gains* (+*dividends*) in the previous month, $Top\ performer$, defined as the share of those from the top-performing fund, and $After$, which is a dummy variable that equals 1 after the change in the display setting. Control variables include total fund holdings and number of funds held in the portfolio in the previous month. Robust standard errors are clustered at the account level. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively.

Dep. Var.: Total Consumption	(1)	(2)	(3)	(4)
CG×Top Performer	0.0057	0.0018		
	(0.0053)	(0.0053)		
CG	0.0041**	0.0024		
	(0.0020)	(0.0020)		
CG×Top Performer×After	0.0349***	0.0352***		
	(0.0085)	(0.0085)		
CG×After	0.0110***	0.0064**		
	(0.0032)	(0.0032)		
Top CG/Overall CG	-5.3066*	-5.1574*		
	(3.0552)	(2.9793)		
(Top CG/Overall CG) × After	-26.418***	-27.351***		
	(8.6573)	(8.8487)		
(CG+Div)×Top Performer			0.0072	0.0036
			(0.0052)	(0.0052)
CG+Div			0.0037*	0.0017
			(0.0019)	(0.0019)
(CG+Div)×Top Performer×After			0.0300***	0.0308***
			(0.0083)	(0.0083)
(CG+Div)×After			0.0121***	0.0074**
			(0.0031)	(0.0031)
(Top CG+Div)/(Overall CG+Div)			-9.0571***	-8.8154***
			(3.2721)	(3.3176)
(Top CG+Div)/(Overall CG+Div) × After			-24.376***	-25.398***
			(8.0145)	(8.2483)
Holding		0.0016***		0.0016***
		(0.0001)		(0.0001)
# funds		1545.4***		1544.4***
		(153.45)		(153.44)
Account FE	Y	Y	Y	Y
YearMonth FE	Y	Y	Y	Y
R squared	0.0001	0.0004	0.0001	0.0004
N	4595967	4595967	4595967	4595967