Limited Attention and the Uninformative Persuasion of Mutual Fund Investors

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Keywords: Limited attention; Behavioral accounting; Investor psychology; Capital markets; Disclosure; Mutual fund fee-setting; Advertising

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Singer Tom Petty once warbled that the waiting is the hardest part. Now that wait is finally over for many mutual-fund managers. That is because 2007 marks a milestone that could greatly help their funds: It will have been five long years since the late-2002 bear-market bottom. This means that five-year performance numbers no longer will reflect the market's steep slide. Instead, they will capture the market's upswing since then. Funds took the brunt of the dot-com bust at different times. January 2002, for instance, was a particular low for Old Mutual Focused Fund, which had a sinking, large position in Adelphia Communications Corp., a cable company that eventually filed for bankruptcy-court protection. "I'm very anxious to roll off that quarter specifically," says Jerome Heppelmann, manager of the fund. Its five-year annualized return has more than doubled to 6.4% through December 2006, compared with a 2.8%-a-year gain at the end of 2005. [1]

1. Introduction

Regulators and academics have devoted a considerable degree of attention to the manner which information is made publicly available to investors. As Hirshleifer and Teoh (2003) note, investors react differently when disclosure takes different forms, even when the information content of alternative formats is identical. In turn, variation in investor responses has led regulators to specify particular formats in which information can be disclosed. For example, in response to requirements under the Dodd-Frank Act, in 2012 the Securities and Exchange Commission (SEC) formed the Investor Advisory Committee (IAC) in part to evaluate changes necessary to ensure investors can effectively utilize information disclosures.[2]

In this paper, we examine how uninformative persuasion and the form of disclosure affect investor fund flows into mutual funds. There are three reasons why this setting is particularly suited to evaluating the influence of disclosure form on investor behavior. First, the behavior of retail investors (their trading activity) can be directly observed via mutual fund sales and purchases. In contrast, individual investor reaction to information disclosure through different forms of financial statements is unobservable. Second, rather than evaluating the complex financial statement disclosures of firms, we examine the simplified disclosures of mutual funds

[1] Diya Gullappalli, The mutual-funds eraser, *Wall Street Journal*, January 26, 2007.
[2] See SEC press release 2012-58.

which are dominated by a very small number of performance metrics. This simplified setting ensures the effects of disclosure form are not obscured by endogenous variation in other disclosure features. Finally, we are able to examine how mutual funds attract investors by selectively varying the prominence of performance metrics via advertising. While investment companies are required to make standardized disclosures to the SEC, reporting mutual fund performance, fees, trading activity and holdings, they may elect to selectively advertise performance metrics in an attempt to attract investors directly, a practice rarely observed for other types of firms.

More specifically, the Investment Company Act of 1940 requires investment companies to make quarterly, public disclosures to the SEC, reporting fund expenses borne by investors, past performance, and portfolio investments.[3] The National Association of Securities Dealers (NASD) notice number 94-60 specifies that past performance must be reported in the form of an holding period return (HPR) over the horizons of 1, 3, 5, and 10 years for funds in existence over those horizons. The horizon must be at least one year long and must end with the latest calendar quarter. These requirements are designed to standardized performance reporting across funds and ensure that fund managers are not selecting reporting horizons which optimize disclosed performance.

The focus of our analysis is the interpretation of the change in disclosed HPRs by mutual fund investors. For example, consider the following 5 quarter return time series:

Period	-1	-2	-3	-4	-5
Return	-2%	3%	4%	5%	-4%

The annual HPR for quarters -2 to -5 is 8% and the corresponding annual HPR for quarters -1 to -4 is 10%:

$$HPR_{t-1} = [(1+-0.02)(1+0.03)(1+0.04)(1+0.05)] - 1 = 0.102$$

$$HPR_{t-2} = [(1+0.03)(1+0.04)(1+0.05)(1+-0.04)] - 1 = 0.079$$

[3] Prior to 2004, the disclosure frequency was semi-annual.

Even though the fund experienced a negative return in the most recent period (*t*=-1), the HPR increased as the end-return which dropped from the sample was more negative than the most recent return. The *change* in the HPR is therefore a function of the most recent return (-2%) which enters the horizon and the end-return (-4%) which drops from the horizon. As all other intervening returns are common in the return sequences (*t*-2, *t*-3, and *t*-4 in this example), they have no influence on the change in the HPR. Thus, the change in HPR is influenced both by new information (reflected in the most recent fund return), and stale information (that was disclosed to investors four quarters previously).

As illustrated by the introductory quote, mutual fund managers feel that the stale information component impounded in HPR changes influences investors. The quoted manager is "anxious to roll off" a quarter with particularly poor performance. In other words, the manager anticipates a pending improvement in the fund's reported performance resulting from a negative end-return dropping from the horizon of the HPR calculation. However, the improvement in the reported HPR reflects only that the immediate performance was less negative than the quarter being rolled off. For the fund in question, therefore, after controlling for the most recent period's returns, the change in the HPR should not provide any new information regarding manager ability or future fund performance.

If investors have access to monthly fund returns, the new and stale information components imbedded in the change in HPR can easily be decomposed into new and end-return effects. It is plausible that at least some investors have this information. Our analysis spans the period of 1992 to 2010, during which the availability of mutual fund information expanded dramatically, evolving from paper disclosures by mutual funds to the SEC to electronic availability of mutual fund disclosures and related data via EDGAR and data providers such as Morningstar. However, we argue that they do not necessarily use this information. Our setting is analogous to the theoretical approach of Hirshleifer and Teoh (2003) in which investors have limited attention and processing power and potentially lack the sophistication to interpret the disclosed information. Regardless of the availability of past returns, investors are overwhelmed by the volume of public information available to assess mutual fund quality and thus gravitate to information that is presented in a salient, easily processed form. Further, it is not clear that the average retail investor understands the manner in which HPRs are calculated and consequently the influence of stale information when evaluating the time series of HPRs. This information is not included in the disclosure and only investors with some level of finance education would understand the nuances of performance reporting.

We document three results in the paper. First, analyzing investor allocations, we find that investors appear unable to differentiate between the new and stale information components of performance disclosures by mutual funds. It is well understood that investors "chase" past performance, allocating disproportional wealth to funds with strong recent performance, despite limited evidence of persistence in mutual fund performance (Berk and Green, 2004). Our results suggest that investors react with equal vigor to the stale information component of HPR. In other words, investors appear to not understand the influence of the disclosure form on perceived improvements in mutual fund performance, allocating disproportionate wealth to funds which realize improved HPRs due to end-returns dropping from the horizon of HPR calculation. Second, mutual fund managers specifically cater to and exploit this behavior by preferentially advertising end-return related improvements in reported performance. Third, mutual fund managers also align fee increases with periods of artificially heighted fund demand which result from end-return related increases in performance, harming existing investors who pay higher fees for the same fund and potentially leaving new investors worse off.

Specifically, examining the universe of actively managed, domestic mutual funds in the U.S., we first show that investors consistently react to end-return effects on HPRs. In separate regressions, we relate mutual fund flow in month *t* to fund return in month *t*-1 (new information) plus one of the other monthly return lags up to lag 61 (stale information). For example, the first regression includes the fund returns in *t*-1 and *t*-2 as independent variables, the second regression includes the fund returns in *t*-1 and *t*-3 as independent variables, and so forth across 60 separate regressions. This approach allows us to decompose investor reaction to the change in HPR into new and end-return components. We then exploit differences in visibility of different return lags which result from the required horizon of HPR calculations. Given that mutual funds are constrained to report HPRs over specific horizons, investor sensitivity to end-return effects should manifest only for lags specific to those horizons (specifically the 13th, 37th and 61st return lag in our setting, relating to the 1, 3 and 5 year HPR). If investors are influenced by end-return effects, controlling for the new information conveyed by the return from period *t*-1, we expect those specific return lags to be associated with large and negative allocations to mutual funds, as the removal of an observation from the HPR calculation has an inverse effect on the magnitude of the HPR.

This is precisely what we find. On average, mutual fund investor allocations are more than twice as sensitive to return observations realized 13, 37, and 61 months prior than in other months and the coefficients on these return lags are all negative. Although flow sensitivity to lagged performance is non-zero for many lags, only the coefficients for the 13th, 37th, and 61st return lags are statically different from the average. Further, the magnitude of investor sensitivity to these return lags is of equal or greater magnitude to return-chasing on the first return lag. In other words, abnormal flow sensitivity to lagged performance is only observed for the most recent return and lags that coincide with the end of reported HPRs. Investors appear to fail to recognize the influence of time on HPR calculation horizons and direct disproportionate flows towards funds which benefit from the statute of limitations expiring on prior poor performance. We refer to this as the stale performance effect.

These allocations are also markedly asymmetric. Investors react strongly to improvement in HPRs which result from removal of negative end-returns, but are relatively unresponsive to decreases in HPRs which would result from positive end-returns dropping from the calculation. This behavior is consistent with incentives created by advertising. In the second part of the paper, we show that mutual funds preferentially promote high HPRs and time advertising to periods when the 1, 3, and 5 year horizon HPRs are coincidentally high. This is not surprising since funds would be expected to selectively promote high returns. However, controlling for these incentives, we find that advertising spending is *incrementally* higher when the fund has benefited from end-return related improvements in HPRs. In other words, while mutual funds promote positive HPRs, they appear to preferentially promote performance measures which attract investors who are unable to differentiate between current and stale performance effects on HPRs. This is also not entirely surprising. It is likely to be easier to time advertising around predictable improvements in HPRs that result from negative end-returns dropping from the HPR horizon. Future HPRs cannot be perfectly forecasted as they are influenced by the added new return (which cannot be predicted) and the dropped end-return which can be perfectly anticipated. However, as discussed in the introductory quote, in instances when the end-return is sufficiently large and negative, a relative improvement in HPRs can be easily foreseen.

In additional results, we find that the stale performance effect is more pronounced for funds with greater marketing expenditures and the effect is most pronounced for fund-specific advertising that features HPR information. We also find that investor reaction to end-return effects on HPR is more pronounced in high relative to low fee and portfolio turnover funds, proxies for investor sophistication that have been used in the prior literature.

In the final part of the paper, relating the total expense ratio of the fund to our stale performance effect measures and controls, we find that mutual funds time fee increases, by reducing waivers, to coincide with periods of positive performance caused by negative end-returns dropping from the HPR horizon. A one standard deviation increase in the stale performance signal is associated with an increase of 20% in the fund's expense ratio.

Our results contribute to the growing literature on how investors with limited attention react to information. Lawrence (2013) shows that investors invest more in firms with clear and concise financial disclosures. Cooper, Gulen, and Rau (2005) argue that investors are influenced by cosmetic effects. They show that mutual funds attract flows by changing their name to the current hot style with little underlying change in portfolio holdings. Barber, Odean, and Zheng (2005) argue that the purchase decisions of mutual fund investors are influenced by salient, attention-grabbing information. Investors buy funds that attract their attention through exceptional performance, marketing, or advertising. We show that investors may also react to apparent increases in performance mechanically created by dropping stale returns which occur as a function of the required disclosure form.

The most novel contributions of our paper, however, are the examination of opportunistic behavior by managers. There is limited evidence in the literature on the channels through which managers take advantage of behavioral biases. Li (2008) shows that annual report readability is related to earnings persistence in that the annual reports of firms with lower earnings are harder to read. He argues that this is consistent with managerial incentives to obfuscate information when firm performance is weak (Bloomfield, 2002). Mullainathan, Schwartzstein, and Shleifer (2011) model uninformative persuasion where individuals think coarsely, grouping situations in categories and applying the same models of inference to all situations in the same category. They show that persuaders take advantage of coarse thinking by framing objectively useless information to influence individual's choice of category. Our research provides new evidence on how and when mutual funds use uninformative information (i.e. stale performance signals) to persuade investors that they are high-performance or quality funds.

Palmiter and Taha (2012) argue that performance advertising by mutual funds is inherently and materially misleading, violates federal securities antifraud standards, and takes advantage of naïve investors. Provisions under the 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act require further intervention by the SEC.[4] To our knowledge, we are the first to document evidence consistent with funds planning advertising campaigns based on stale performance information and then strategically increasing fees to exploit return-chasing based on stale information. Our results are broadly consistent with investors being misled by the information disclosures of mutual funds, which result from the selective form of the disclosure of performance metrics with limited context.

[4] Specifically, the Act requires the Government Accountability Office to conduct a study on mutual fund advertising to identify (1) existing and proposed regulatory requirements for open-end investment company advertisements, (2) current marketing practices for the sale of open-end investment company shares, including the use of past performance data, (3) the impact of such advertising on consumers, and (4) recommendations to improve investor protections in mutual fund advertising and additional information necessary to ensure that investors can make informed financial decisions when purchasing shares. See the Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, § 918, 124 Stat. 1376, 1837 (2010).

2. Literature Review and the General Setting

Mutual funds are predominantly held by individual investors. In 2012, 44% of US households held mutual funds and 89% of US mutual fund assets were held by households. The median income of households which invest in mutual funds was $80,000 and 68% of those households held over 50% of financial assets in mutual funds.[5] Thus, the typical mutual fund investor is an individual whose professional training is likely focused on a non-financial field, has limited time and who potentially lacks the expertise to make informed investment selections.

Due to the large number of funds available and the wealth of information provided by investment companies, analysts and other investors via social networks, limited attention is a likely outcome of the information disclosure environment of mutual funds. Evaluating the merits of an actively managed mutual fund involves assessment of the asset picking and market-timing ability of the manager as well as the risk exposures inherent to the category of assets held by the fund. Individual investors must allocate attention selectively between work, personal life and making investment decisions. Directing attention to a specific task requires effort and necessitates exclusion of other tasks (Fiske, 1995) and tends to be directed to information that is more vivid or salient (i.e. which is more prominent or which stands out).[6] Further, the manner in which attention is allocated depends on the ease with which "relevant instances come to mind" (*availability heuristic*, Kahneman and Tversky, 1973). For example, Lawrence (2013) and Rennekamp (2012) find that investors react more strongly to more readable disclosures which use plain English.

In our setting, HPRs feature extremely prominently in mutual fund disclosures and are likely perceived as readily comprehensible by investors, thus being appealing both in terms of salience and availability. A sample mutual fund advertisement appears in panel A of Figure 2, providing a sense of the prominence of the return disclosure. HPRs receive similar prominence in fund prospectuses and web sites, two other common mediums of disclosure. Interpreting the

[5] See the 2013 Investment Company Institute Fact Book, 53rd Edition.
[6] For example, Amir (1993) reports that footnote disclosure of post-retirement benefits are underweighted by investors. See also the discussion by Fiske and Taylor (1991).

returns disclosed in the advertisement, an investor may perceive that recent fund performance has been stronger than over longer horizons (reflected by the 1 year relative to the 3 year HPR). Beyond contrasts over adjacent horizons, investors likely also contrast changes in common horizons across timeframes (i.e. comparing the 1 year HPR in the current and previous quarters). However, as previously discussed, given the information in the disclosure, it is impossible for the investor to discern if the higher 1 year performance is due to a low end-return dropping from the 1 year horizon or strong recent performance. To disentangle the new and stale information components impounded in the disclosed HPRs, investors must access higher frequency return data. This requires a greater allocation of attention, assuming the investor is sophisticated enough to understand the need for such additional effort.

There is evidence that even sophisticated investors, such as analysts, are influenced by the form and prominence of financial disclosures. For example, Hand (1990) reports abnormal reaction to re-announced gains from debt-equity swaps in quarterly earnings announcements and Plumlee (2003) finds that analyst's revisions of forecasts of effective tax rates reflect less complex tax law changes but not more complicated information. Thus, even if investors understand the nuances of HPR reporting, framing or inattention may lead to misinterpretation of reported mutual fund performance. We contribute to this literature by focusing on individual investor interpretation of mutual fund disclosures, which, as previously discussed, is the primary investment vehicle for a significant proportion of US households. Aside from the previously discussed analysis by Lawrence (2013), the majority of the information disclosure literature has used small trades to proxy for individual investor behavior but this proxy is imperfect.[7] Our analysis allows a more direct examination of the effect of disclosure form on individual investors in a previously unconsidered setting.

[7] See, for example, Bushee et al. (2003, 2004) and Miller (2010).

3. Measuring Investor Reaction to Stale Performance

We obtain mutual fund data from the Center for Research in Security Prices (CRSP) Mutual Fund Database. Our sample commences in 1992, when CRSP consistently begins reporting monthly frequency total net asset (TNA) values and concludes in December 2010. The CRSP database provides monthly TNA and returns by fund share class as well as quarterly or annual disclosures of management and 12b-1 fees, front and back end loads, portfolio turnover, and fund management objectives. We aggregate multiple share classes of the same fund, weighting returns, fees, loads and portfolio turnover by share class TNA, and focus our analysis on actively managed, domestic equity funds.[8] The early part of the time series of our dataset (1992-1998) includes on average 1,774 funds, provided by 470 separate investment companies (fund families) with a combined TNA of 1.0 trillion USD. Our dataset expands to include on average 3,093 funds, 534 families, and a combined TNA of 3.7 trillion USD in the later part of the data time series (2005-2010).

To measure the stale performance effect, we first calculate net flow, where flow for fund *i* in month *t* is calculated as the percentage change in TNA while controlling for return (*R*) effects:

$$Flow_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1} \times (1 + R_{i,t})}{TNA_{i,t-1}} \quad (1)$$

We then relate net flow to the first return lag plus successive return lags up to 61 lags, in 60 separate regressions:

$$Flow_t = \alpha + \beta_1 R_{t-1} + \beta_n R_{t-n} + \epsilon_t \quad (2)$$

where n signifies the lag of the second return included as an independent variable. For robustness, we replicate our analysis augmenting equation (2) to include $flow_{t-1}$ as an independent variable to control for persistence in mutual fund flow and find similar results.

As previously discussed, to motivate our use of equation (2), we note that the *change* in HPR has only two influences, the magnitude of the return in the current period and the magnitude of the end-return which drops from the calculation. These two returns have an

[8] To identify actively managed mutual funds, we use the list of actively managed funds from Cremers and Petajisto (2009) available from Antti Petajisto's website http://www.petajisto.net/data.html.

equivalent impact on the HPR, though only the former is new information. Modeling investor response to the change in HPR, it then follows that $flow_t$ becomes a function of the new and end-return, linearly approximated by equation (2). All intervening returns are common between adjacent HPRs and have no influence on ΔHPR. Thus, equation (2) allows the decomposition of the change in the HPR into its only influences, the current return and end-return components, allowing us to differentiate stale performance chasing from the well documented investor response to the most recent return.

We note that a range of factors influences flow beyond lagged returns. At this stage, our objective is not to exhaustively test a comprehensive set of flow influencing factors but to motivate the first stage of an eventual two-stage model. As we seek to test both time series and cross-sectional influences of investor sensitivity to end-return effects on HPRs, the dependent variable in our second stage tests will be the annual time series of β_n coefficients from equation (2). Using monthly returns over an annual horizon, the available degrees of freedom constrains the number of independent variables which can be included in the first stage. However, additional control variables can be effectively implemented in the second stage. Further, the influence of many common flow determinant controls on stale performance chasing is also of interest and these relations are more effectively evaluated in a second stage model as opposed to via complex interaction terms in the first stage.

If investors interpret the stale information component of the change in HPRs as informative regarding future fund performance, we expect the β_n coefficient in equation (2), which relates to return observations at the end of required HPR reporting periods, to be significant after controlling for the return in the most recent period. Additionally, we expect the β_n coefficient to be negative, given the inverse relation between the magnitude of the dropped return observation and the change in the HPR. We have no clear predictions regarding expected coefficient values for return lags not associated with the end of common HPR periods. To the extent that return information is costly or time consuming to obtain, investor reaction to performance information may occur in a delayed manner. However this would bias against our tests. In other words, stale performance chasing behavior may be realized across a range of return lags but *abnormal* responses should only be associated with return lags associated with the end of required HPR reporting periods.

4. Results

4.1. Chasing Stale Performance

The β_n coefficients from the pooled OLS regression series in equation (2) and associated t-statistics are reported in Panel A of Table I. For ease in making a quantitative comparison, the β_n coefficients are also displayed in a bar graph in Panel A of Figure 1.

As discussed, mutual funds are required to report HPRs in set intervals of 1, 3, 5, and 10 years. Utilizing a comprehensive dataset of mutual fund magazine advertising from 2005-2010, we find that though not all advertisements reported HPRs, all advertisements that did report HPRs in our sample conform to this convention, with the exception of very young funds which report HPR since inception.[9,10] These intervals are also used by Morningstar, a leading provider of mutual fund information for retail investors. Given the length of our sample, we focus on the first three intervals. Thus, the variables of interest in Table I and Figure 1 are the *relative* magnitudes and signs of the 13th, 37th, and 61st monthly return lag. Focusing first on Panel A of Figure 1, we observe that the coefficients of interest (which are highlighted in red) are all negative and visually appear to be greater in magnitude than the other lags. Interestingly, the 25th return lag also appears relatively large and is similarly negative.

[9] The advertising dataset is described in detail in the Appendix. In 1994, the SEC approved mutual fund advertising guidelines proposed by the NASD (NASD notice number 94-60) which required funds to report performance over 1, 5, and 10 years for funds in existence over these horizons. The time period must be at least one year long and must end with the latest calendar quarter.

[10] Figure 2 Panel B gives an example of an advertisement that did not report HPRs.

Turning to Panel A of Table I (where the coefficients of interest appear in bold face), we first note that there are several individual coefficients apart from coefficients of interest that are also significantly different from zero (examples include β_4, β_6, or β_7). However, this is not surprising as we have no priors that investors should *never* use prior period returns when directing flows to funds. The non-zero coefficients on arbitrary past periods is evidence that they do. Our thesis is that *abnormal* sensitivity to past performance should manifest only on the first return lag which reports new information and return lags associated with the end-return of reported HPR periods. Thus, the significance of each return lag coefficient relative to the coefficient average is of interest, not whether a specific lag is different from zero.

We find that the coefficients related to the 13th, 37th, and 61st return lags are larger than *all* the other coefficients. The average absolute coefficient size across the entire sample is 0.15, compared to an absolute average of the coefficients of interest of 0.31, a twofold difference in magnitude.[11] The magnitude of this difference is large and significant at the 10% level (the average t-statistic of the test H_o: absolute β_{13} or β_{37}, or $\beta_{61} =$ the average absolute value of all coefficients is 1.77).

For comparison, we report the absolute mean comparison t-statistics for the other lags. *None* of the other coefficients are significantly different from the absolute mean of the coefficient sample. In particular, the 25th and 49th return lag coefficients are not significantly different from the absolute mean of the coefficient sample (t-statistic 0.86 and 0.52, respectively). It is also noteworthy that the magnitudes of return-chasing on the lags of interest (13th, 37th, and 61st) are of equal or greater magnitude to return-chasing on the first return lag (the average coefficient value on the first return lag in equation (2) is 0.25). Thus, investor asset allocations are equally or more sensitive to the stale information reflected in HPR end-returns relative to new information reflected in the recent return and *only* these signals elicit an abnormal response from investors.

[11] Since the average coefficient value of the sample is zero, the regression t-statistics already confirm that each of the coefficients of interest is different from the raw sample average.

A potential concern when interpreting these results is whether investors are responding to idiosyncratic fund returns or to objective-level trends. As the introductory quote notes, since the effect of major market events are realized by funds at different times, we expect that both fund objective and idiosyncratic HPRs should influence stale performance chasing. Thus, as an alternative measure of fund-level return-chasing, we replicate equation (2) using fund returns in excess of the value-weighted mean objective return as the independent variables. The results are reported in Panel B of Table I and are visually presented in Panel B of Figure 1. In the excess return model, the coefficients of interest are slightly more negative (average -0.31 and -0.34 for raw and excess returns, respectively). The significance of the test H_o: absolute β_{13} or β_{37} or β_{61} = the average absolute value of all coefficients is also greater (average t-statistic 2.14). We also find that the size of 25th return lag is much less negative (-0.27 vs. -0.19 in the raw and excess return specifications, respectively). Thus, we observe the same relations in the excess return specification with stronger significance.

We next implement a series of robustness tests which are reported in Panels C and D. As previously discussed, only the most recent return and the end-return which drops from the sample influence the change in HPR and our focus is to determine if investors differentiate between these two sources of change in HPRs. For this reason, we exclude intervening returns from the stale return-chasing model. The alternative hypothesis to stale performance chasing is that investors observe the full time series of returns and make asset allocation decisions jointly and simultaneously considering all available returns. Under this alternative hypothesis, stale performance chasing should not be observed as the investor can easily decompose the change in HPR into current and stale information components. In Panel C, we replicate Panel B, but estimate the coefficient on each return lag simultaneously in one pooled regression, in essence assuming that investors observe and adjust flow jointly based on all 61 return lags (equation (3)).

$$Flow_t = \alpha + \sum_{n=1}^{61} \beta_n R_{t-n} + \epsilon_t \qquad (3)$$

Our conclusions are unaffected. The coefficient estimates between Panel B and C are highly similar and, if anything, stale performance chasing is more prevalent under this alternative model. The average coefficient size is -0.36 relative to -0.34 in the joint versus the individual models (Panel C relative to B), the precision of the coefficient estimates are higher (reflected by higher regression t-statistics) and the difference t-statistics are higher for all three coefficients of interest. The results are highly similar when calculated using raw returns.

Panel D reports additional robustness tests. In the interest of brevity, we report coefficient values only for the variables of interest (β_{13}, β_{37}, and β_{61}), the estimates being similarly consistent across models with Panel A for the unreported coefficients. First, to control for potential outlier effects at the fund-level and to ensure our results are consistent over time, we replicate the models clustering standard errors by fund and year. As reported in model (2) of Panel D, clustering by year and fund typically improves the significance of the coefficient estimates.

Second, we recognize that seasonal activities undertaken by funds, such as window dressing or dividend payments may bias our estimates. For example, funds predominantly pay dividends in December and the majority of investors instruct the fund to automatically reinvest dividends.[12] CRSP adjusts returns to include dividends, thus for dividend paying funds, returns are bolstered in December and NAV increases by the reinvested dividend amount. It is important to recognize that our model inherently controls for seasonal effects, as returns are not necessarily calendar aligned as the return series for each fund starts at inception which may occur at any time. Thus, for example, $R_{t\text{-}13}$ is not inherently a December return for all funds.

Focusing on the effect on estimated flow in equation (1), the reinvested NAV offsets the higher return resulting from realized dividends, but given that not all dividends are re-invested, flow in dividend paying months is systematically lower (holding other factors constant). To mitigate concerns related to seasonal effects, we utilize two approaches. First, we replicate our models clustering by month. Model 3 shows that our results are robust to this adjustment.

[12] In the 2011 Factbook, the Investment Company Institute reported that investors reinvested $173 out of $202 billion USD paid in dividends (86%). Examining the payment period in the CRSP database, 20% of dividends are paid in December, with remaining dividends spread evenly over the remaining months with the exception of small increases in frequency at the end of calendar quarters.

Second, we utilize total sales and redemptions from the N-SAR filings of each fund available from Morningstar. This alternative data source enables the direct calculation of flow (sales – redemptions) from which we exclude re-invested dividends. Models (4) – (6) report coefficient estimates of equation (2) with flow excluding dividend effects, sales, and redemptions as alternative dependent variables. Here again, the significance of the coefficients of interest improves utilizing the alternative flow measures. The effects are similar between sales and redemptions, indicating that the stale performance chasing effect results collectively from increased sales and reduced redemptions. Thus, stale performance signals appear to influence both current and new investors (or at least new money from current investors). To further control for end-of-year effects, we replicate equation (2) excluding December returns and in unreported results, find the same results (the average coefficient of interest is -0.34 and -0.30 for the raw and excess return models, respectively).

Finally, Spiegel and Zhang (2013) argue that fractional flow as calculated in equation (1) fails to consider the effect of aggregate flow when testing the flow-performance relation. As shown by Chalmers, Kaul, and Phillips (2013), flow moves in and out of mutual fund classes (i.e. equity relative to money market funds) in unison in reaction to macroeconomic factors. Flow-performance models which fail to control for correlated flows across funds of the same type may be misspecified. As advocated by Spiegel and Zhang (2013) and used by Chalmers, Kaul, and Phillips (2013), we replicate our models using the change in market share as an alternative measure of investor asset allocations, where the change in market share (Δm) is calculated as:

$$\Delta m_{i,t} = \frac{n_{i,t}}{\hat{N}_t} - \frac{n_{i,t-1}}{\hat{N}_{t-1}} \qquad (4)$$

where $n_{i,t}$ is total net assets under management for fund *i* in period *t*, and $\hat{N}_t$ is aggregate total net assets for all funds in existence at time *t*. Here again, the results are highly consistent with Panel A and, if anything, suggest a stronger stale return-chasing reaction by investors (average value of coefficients of interest is -0.35 relative to -0.31 in Panel A).

In sum, these results provide strong evidence of mutual fund investors chasing stale performance. Mutual fund flow is significantly more sensitive to lagged returns associated with the end of commonly reported HPR periods. These findings are consistent with mutual fund investors observing changes in HPR values and interpreting these changes as new information regarding future fund performance.

4.2. Asymmetry in Stale Performance Chasing

Sirri and Tufano (1998) document asymmetry in the flow-performance relation in mutual funds. Investors allocate disproportionate wealth to funds with strong performance in the prior period, but fail to withdraw assets proportionally from funds which perform poorly. Two explanations have been offered, one rational and one behavioural. First, Lynch and Musto (2003) argue this is a rational response to prior performance as funds which performed poorly are likely to either revise their strategy or replace the fund manager. Thus, for poorly performing funds, prior performance is less informative regarding future performance. Alternatively, mutual fund investors may be biased by the “disposition effect”, i.e. they are hesitant to lock in losses by selling, implying that they hold losers too long (Bailey, Kumar, and Ng, 2011).

It is important to note that the rational explanation is not necessarily relevant in our context. The change in disclosed performance is simply driven by the mechanical change in the holding period over which the fund return is computed. It is implausible that funds are likely to revise their strategies based on a change in the HPR. However, our results can be related to the disposition effect, albeit indirectly. If investors do not compute the actual returns they are earning on their investments but simply rely on the reported HPRs, they may fail to recognize losing funds since the reported HPR has improved. While this is not the disposition effect, the empirical implications are similar. Rather than investors being reluctant to realize losses, here they do not realize that the fund is underperforming. Spiegel and Zhang (2013) offer new evidence that the flow-performance relation is actually linear, once model misspecification is corrected using the change in market share, as opposed to fractional flow, as the measure of investor asset allocations. As previously shown, our results are robust to this alternative specification.

To examine asymmetry in stale performance chasing, we augment equation (2) to include performance ranks in the regressions which include the 13th, 37th, or 61st return lag as an independent variable. The performance ranks for the *t-n* returns are calculated as in Sirri and Tufano (1998) where a fund's performance fractional rank represents its percentile performance relative to other funds in the same objective classification. The ranks are estimated using a piecewise linear regression framework over the five quintiles.

Our results are reported in Table II. As noted by Sirri and Tufano (1998) in relation to return-chasing on the first return lag, we find that stale performance chasing is also strongly asymmetric. For funds in the bottom quintile of performance, where HPRs *improve* the most, flows are highly sensitive to returns in each of the lags of interest (average *t*-statistic for the bottom return quintile coefficient in models 1, 3, and 5 is 3.81). This sensitivity is not linear. For funds in the top return quintile which realize the largest *reductions* in HPR, the relation between flow and lagged return is insignificant. The results are similar when we aggregate the middle three quintiles (models 2, 4 and 6). Unreported tests utilizing excess returns to calculate the return-chasing coefficients are similar and lead to the same conclusions. While these results are consistent with the disposition effect for return-chasing asymmetry, they are also consistent with the marketing practices of mutual funds. Jain and Wu (2000) and Mullainathan and Shleifer (2005) find that mutual funds which experience positive performance are more likely to advertise these trends, increasing investor awareness of these funds and increasing the likelihood of chasing positive stale performance. We explore the potential influence of advertising and fund visibility on stale performance chasing in the next section.

4.3. Determinants of Stale Performance Chasing: Fund Visibility

4.3.1. Marketing Expenditure Proxies

We utilize two proxies for marketing expenditure. First, following Sirri and Tufano (1998), we use the 12b-1 expenditure of the fund. We note that the 12b-1 fee is a noisy proxy. Although described as being levied to cover marketing and distribution expenses, only approximately 2% is used for promotion or advertising. The balance is used for advisor initial sales incentives (40%), ongoing shareholder services (52%) and underwriting fees (6%) (ICI, 2005). However, even though a relatively small proportion of the 12b-1 fee is directed at advertising, it is still used in prior research as a reasonable proxy for the general marketing effort of the fund.

Our second proxy for marketing expenditure is investment company advertising data compiled by Kantar Media (KM). KM is an advertising consulting firm which makes available compendiums of advertising activity in all U.S. media outlets. Although KM collects data for all advertising mediums, our data is limited to print media (newspaper and magazine) advertising, which Reuter and Zitzewitz (2006) report accounts for 65% of total investment company advertising expenditures. The KM dataset includes estimates of advertising expenditure based on advertisement size, placement, and periodical. This data is summarized monthly by investment company and periodical from 2005 to 2010. In addition, for the magazine advertisements, a PDF copy of each advertisement is supplied. A detailed description of the advertising dataset construction process appears in the Appendix. In total, 123 magazines and 3 newspapers appear in the dataset. Examples include common finance periodicals such as the *Wall Street Journal,* the *New York Times*, *Barron*, and *Bloomberg Business Week* in addition to magazines with other focuses such as *Bon Appetit*, *Coastal Living*, or *Rolling Stone*. 144 unique fund families advertise at least once in the dataset. The magazine portion of the dataset features 2,355 unique advertisements, many featured in multiple magazines over multiple months.

Table III presents summary statistics for the advertising dataset. On average, investment companies spent 264 million USD on print media advertising annually. Spending typically increases annually, on average by 16% year-over-year, with the exception of 2008 to 2009 when advertising expenditures dropped by 31%, coinciding with the start of the mortgage backed security (MBS) crisis.[13] On average, 66% of advertising expenditures were directed at magazines relative to newspapers. These values are broadly consistent with Reuter and Zitzewitz (2006) who note that, on average, from 1996 to 2002 investment companies spent 199 million USD per year on print media advertising, with a 60:40 proportion between magazines and newspapers.

To provide a sense of the objective of investment company advertising, we partition the magazine advertisements by focus. Investment companies often provide a range of products and services in addition to mutual funds, such as exchange traded funds, retirement plans, or other types of investment plans. On average, only 32% of advertising undertaken by investment companies directly promotes mutual funds. Of the advertising focused on promoting mutual funds, on average, 31% focused on general promotion of the fund family, while the other 69% promoted one or more specific funds. 33% of fund specific advertising promoted the HPR of the featured funds, while the remaining 67% commonly advertised ranking of the fund by Morningstar or another evaluator of mutual fund performance (such as Lipper or Barron), promoted the fund's fee structure, or promoted the fund manager (examples of both these fund types appear in Figure 2 Panels A and B). The trend of increased spending on advertising from year-to-year is evident in each of these partitions with the noteworthy exception of spending on advertisements that feature HPRs. In 2005, 54% of fund specific advertising promoted HPRs and this proportion declines throughout the sample, dropping sharply from 2007 to 2009, coinciding with negative market performance associated with the MBS crisis. In 2009, investment companies spent 17 times less money promoting HPR results than in 2005 (26.9 million in 2005 relative to 1.6 million USD in 2009). This trend is consistent with investment companies preferentially advertising HPR information only when performance is strong.

[13] The number of corresponding advertisements decreased by 20% between 2008 and 2009, suggesting that some of the change in advertising expenditure may be associated with advertising price reductions or that parent companies elected to place lower costs advertisements (for example, placing the same advertisement but altering advertisement size or location within the periodical).

To more closely examine the determinants of HPR advertising, in Table IV, we relate the change in HPR advertising expenditures at the fund level to HPRs estimated over commonly reported HPR horizons plus control variables at an annual frequency. We limit our sample to funds which advertise HPR results at any time between 2005 and 2010. As shown in Table III, a relatively small proportion of advertising promotes HPRs. Many fund families elect not to advertise HPRs, or for that matter, elect not to advertise at all. We focus on funds which advertise HPRs as our objective is to model the timing decisions and incentives to utilize HPRs as a promotional tool and not the underlying decision of whether to advertise or not. For controls, we follow Gallaher, Kaniel, and Starks (2008) who find that performance over the prior year, family size, loads, fees, portfolio turnover, Morningstar rating, flow, and flow volatility influence annual family-level advertising expenditures. To this list, we add market return as Mullainathan and Shleifer (2005) find that funds are more prone to advertise performance results during periods of strong market performance, regardless of the relative performance of the fund. We also include fund age, as young funds may be more likely to advertise to increase investor awareness.

In models (1) - (3) of Table IV, we find that, for funds spending more money advertising HPRs the year after the 1, 3, and 5 year HPRs are individually higher (average t-statistic 3.27), consistent with funds seeking to draw attention to prior strong performance.[14] The significance of each HPR coefficient is retained when the three HPRs are considered jointly (models (4) – (6)) and the influence of HPRs over the 3 considered horizons is similar. Thus, controlling for the HPR in the most recent period, mutual funds tend to advertise more when more distant returns have been positive. Likewise, when HPRs over the 3 horizons are jointly high (interaction coefficients in models (7) – (9)), mutual funds spend incrementally more on HPR advertising.

Finally, we explore if mutual funds preferentially advertise performance changes due to dropping of stale returns. Specifically, we seek to understand the source of the relative size of the HPR advertised by mutual funds, i.e. is the HPR high due to positive recent performance or due

[14] To ensure clarity in our notation, $HPR_{t-1}^{3\,Year}$ refers to the 3 year HPR calculated using monthly returns and ending in year *t*-1.

to the passage of time and weak prior performance dropping from the sample? To make this distinction we examine the 1 year HPR which dropped from the sample (i.e. the $HPR_{T-4}^{1\,Year}$or $HPR_{T-6}^{1\,Year}$ for the 3 and 5 year HPR, respectively) and interact its inverse value with the 3 or 5 year HPR. As an example, if funds are preferentially advertising stale performance, we expect greater spending on HPR advertising to occur when the $HPR_{T-4}^{1\,Year}$ is small (large inverse value) reflecting HPRs just improved due to the passage of time and the 3 year HPR is large. Controlling for the most recent return ($HPR_{T-1}^{1\,Year}$) and the 3 or 5 year HPR, we find that spending on HPR advertising is notably incrementally greater when negative returns have just dropped from the sample, resulting in a high HPR. While the size of the HPR interaction term and the base HPR coefficient are of similar magnitude for the 3 year horizon, for the five year horizon the interaction coefficient is almost 3 times the size of the base HPR coefficient. These results suggest a strong preference to advertise stale performance effects on HPRs by mutual funds. For robustness, we replicate the analysis in Table IV utilizing the HPR level, as opposed to the reported analysis using the change in spending, and find similar results. These results are not entirely unexpected. Improvements in HPRs due to dropping poor past periods are likely easier to predict than improvements due to immediate past performance. Hence, funds are more likely to be able to systematically plan advertising campaigns around stale performance related improvements in HPRs than recent performance improvements.

Turning briefly to the control variables, larger funds from larger fund families tend to spend more on HPR advertising. Younger funds typically spend smaller amounts advertising HPRs, perhaps due to the limited performance history available for younger funds. Fund families typically promote funds with lower flows and higher flow standard deviations, funds with higher expense ratios and front end loads, and funds with higher Morningstar ratings. Back end loads and portfolio turnover are not significant determinants of HPR advertising expenditures.

3.3.2. Determinants Analysis

To explore the determinants of stale performance chasing at the fund level, we estimate the annual β_n coefficient time series using equation (2) by fund. We use an annual time series as this is the frequency of fee and turnover disclosure by mutual funds. We then relate the fund-level β_{13}, β_{37}, and β_{61} coefficient time series to determinant variables using a pooled, cross-sectional panel to test a series of hypotheses. In the stale performance chasing determinant models in Tables 5 - 7, we include time fixed effects and cluster by fund. As the dependent variable is an estimated quantity from equation (2), to correct for heteroskedasticity induced by variance in the observations of the dependent variable, we follow Lewis and Linzer (2005) in calculating t-statistics utilizing White (1980) heteroskedastic consistent standard errors. Our fund visibility hypotheses are based on an environment of heterogeneously informed investors who must choose among a large number of fund alternatives.[15] As argued in Sirri and Tufano (1998), search costs are high, both due to the number of alternatives which need to be evaluated and the large amount of information provided by a variety of outlets. We distinguish between mutual fund supplied information (advertising) and *external* fund visibility (where the fund is visible for reasons other than fund supplied advertising). Large funds are more likely to be covered in the popular press, implying that fund supplied advertising is likely to be less important for these funds. We argue that less sophisticated investors, who are unable to differentiate between funds based on more relevant factors, will select funds which reduce search costs via visibility. This effect is likely to be lower for funds with high external visibility. These expectations are broadly consistent with relations noted by Kaniel, Starks, and Vasudevan (2008) who find that the effects of media coverage on fund flow is greater for younger funds which they argue have lower inherent external visibility.

> *Hypothesis 1: Mutual funds which advertise more broadly, and especially mutual funds that advertise HPR information, are more likely to attract investors prone to react to artificial performance trends in HPRs. The effect is likely to be*

[15] In this context, the information set available to each investor is largely homogeneous. Heterogeneity arises from variation in investor ability to effectively synthesize and analyze information as a result of sophistication and time constraints.

lower for mutual funds which are more visible due to their size or the size of their fund family or for funds for which a longer return history is available.

Table V presents our results. The regression analysis in this portion of the paper is limited to the period of 2005-2010 due to the limitations on advertising data availability. Our proxies for external fund visibility include fund size (TNA), age, the number of funds in the mutual fund family, and uncertainty in fund value (proxied by mutual fund return standard deviation). Our proxies for fund supplied visibility include the marketing and advertising expenses for the fund (described in the previous section).

We present two model specifications. As previously discussed, a large proportion of advertising undertaken by investment companies is directed at promoting other products or services or promoting the fund family in general. Advertisements of this nature increase name recognition for all products and may indirectly result in mutual fund sales, for example if a client seeking retirement planning advice is directed to buy the company's mutual funds. Given the preponderance of family level advertising, in Panel A, we analyze family-level advertising expenditures and in Panel B, separately analyze fund-level expenditures.

Recall that a more negative β_n reflects more pronounced stale performance chasing. In Panel A of Table V, we document results that are broadly consistent across the three return-chasing coefficients. Stale performance chasing tends to be lower for larger funds (greater TNA) and funds from larger families (greater family TNA). Similarly, fund age (older funds) tends also to be associated with lower stale performance chasing (limited significance in the β_{13} models). Funds from families which offer a larger number of funds also tend to have less return-chasing, though the relation is typically not significant at conventional levels. Stale performance chasing tends to be higher for funds with greater value uncertainty as proxied by the standard deviation of mutual fund returns over the prior year. These results are consistent with Hypothesis 1: funds that are externally visible to investors are less prone to stale performance chasing as information search costs for these funds are lower and more relevant decision factors can more easily be obtained.

However, controlling for external visibility, we find that the level of advertising significantly increases stale performance chasing (negative and significant coefficient value for combined magazine and newspaper spending, model (2)). Segmenting total advertising expenditures between newspapers and magazines (models (3) and (4)), we find that magazine advertising has a stronger association with stale performance chasing, consistent perhaps with the longer typical life of magazines relative to newspapers. We next partition magazine advertising expenditures by focus (mutual fund vs. other product or service and whether the ad promotes HPRs, model (5)). Advertising which specifically promotes mutual funds induces a larger stale performance chasing response with notably the greatest response resulting from mutual fund focused advertising which reports HPRs (model (6) and (7)). The standardized coefficients on mutual fund focused advertising which reports HPR values is more than twice the size of the coefficients for either non-mutual fund advertising or mutual fund advertising without HPR data.

We also consider an alternative form of fund promotion not undertaken by the fund, but provided by Morningstar via its star ratings. Morningstar ratings are based on performance over the prior 3, 5, and 10 years, adjusted for risk based on variation in the fund's monthly performance, placing emphasis on downward variations.[16] As Morningstar ratings are determined largely based on HPRs, improvements in star ratings are likely to coincide with periods when stale performance effects are realized as the ranking method emphasizes return persistence resulting from the reduction of negative (or lower relative) monthly returns over each horizon. Thus, the Morningstar rating system draws attention to HPR over the same horizons commonly advertised by mutual funds and may be an alternative determinant of stale performance chasing. Across all 8 models, we find that funds more highly ranked by Morningstar are associated with greater stale performance chasing, although the magnitude of the effect is approximately half the size of HPR advertising undertaken by the fund (models (6) and (7)).

[16] See "The Morningstar Rating for Funds" 2008 factsheet.

To contrast the role of external and advertising related sources of visibility on return-chasing, we interact total ad spending with inverse fund TNA. We seek to understand if advertising offsets the small fund effect, rendering small funds more visible to investors. In model (8), we find a significant and negative coefficient value for the interaction term of advertising expenditure and inverse size, suggesting small funds which advertise HPR information realize incrementally greater return-chasing. Unreported results of the same interaction term using the other external visibility proxies (family TNA and fund age) and other advertising expenditure proxies are negative and of similar significance.

Turning to Panel B of Table V, which reports analysis with fund-level advertising expenditures in magazines, we find highly similar results. In the interest of brevity, coefficient values associated with the external visibility proxies are suppressed as they are similar between the family and fund-level regressions. We partition expenditures by whether they: 1) focus on mutual funds vs. other products or services, 2) mention the fund of interest vs. mentioning another fund in the fund family and 3) feature HPR data or not. We first examine the effect of 12b-1 fees. Funds with higher 12b-1 expenditures typically realize more pronounced return-chasing. The relation remains significant when considered jointly with the advertising expenditure proxies (Model (8)), suggesting that 12b-1 fees capture a unique aspect of the fund marketing effort which renders the fund more visible. One potential channel is via broker sales as 12b-1 fees are commonly utilized to create inducements for brokers to sell funds.

Advertising broadly increases stale performance chasing, both at the fund and family-level, regardless of the product or service advertised. We find a negative and significant coefficient in all model specifications for family focused mutual fund ads and ads promoting other products or services (model (2)). Fund specific advertisements that promote another fund have no significant effect on stale performance chasing, which is perhaps surprising given the otherwise broad evidence that non-fund specific advertising typically generates greater stale performance chasing. This result is, however, consistent with investors typically reacting more strongly to HPR advertisements. The strongest inducement for investors to chase stale performance is typically fund specific advertising that mentions HPR results. Focusing on model

(6), the coefficient on fund specified ads which feature HPRs is three times the size of the coefficient on fund specific advertising which does not feature HPR results. The fund-specific HPR reporting coefficient is typically the most negative of all the advertising coefficients, with the exception of the β_{61} specification in which the coefficient on family level mutual fund advertising expenditures is the most negative.

We next undertake a series of unreported robustness checks. First, we replicate our analysis using β_n values calculated using fund return in excess of the value-weighted average objective return in equation (2). Results are consistent using this alternative return-chasing measure. For example, the average coefficient value for mutual fund spending that features HPR data in model (7) of Panel A is -0.28 for both the raw and excess return specifications and the t-statistics are in excess of 3.0 for all three model specifications (β_{13}, β_{37}, and β_{61}).

To control for endogenous fund characteristics to which investors are alternatively reacting, we utilize two alternative model specifications. First, we replicate the analysis adding the return-chasing coefficients not considered as the independent variables. For example in the β_{13} regressions, β_{37} and β_{61} are added as independent variables. We hypothesize that if investors are reacting to endogenous factors, these factors are likely to be consistent across the 3 return-chasing coefficients and will thus be reflected in commonalities in those coefficients.[17] Second, we replicate the analysis excluding funds which undergo a manager change, as the timing of this change may coincide with improvements in HPR. Our results are robust to both alternative model specifications.

Finally, we replicate the tests using β_{25} and β_{49} as dependent variables. Our expectation is that advertising expenditures should have little explanatory power for return-chasing which coincide with non-standard reporting horizons. Consistent with this expectation, we find an insignificant relation between the β_{25} and β_{49} coefficients and advertising expenditures with one exception. Advertising which promotes a specific fund and reports HPR results is significantly

[17] The average correlation between the return-chasing coefficient pairs is 0.26, suggesting that each coefficient reflects unique stale performance -chasing episodes and do not reflect endogenous fund characteristics to which investors are reacting.

related to stale performance chasing in these two non-standard horizons. However, the magnitude of these coefficients is typically one third the size of the coefficients for the standard horizons (β_{13}, β_{37}, and β_{61}), consistent with spillover effects. For example, investors may be enticed to invest in the fund in a prior period when standard HPR results are advertised and increase their positions following positive returns in subsequent periods.

To summarize our results, flow sensitivity to stale performance effects appears to be largely driven by the magnitude of marketing effort either at the fund or the family level. Funds which advertise more broadly, and particularly funds which advertise favorable HPR results, realize significantly greater inflows following favorable stale performance chasing signals. Stale performance chasing is similarly greater if the HPRs of the fund are indirectly promoted via the Morningstar rating system or broker sales (proxied by 12b-1 fees). Funds with higher star ratings are more prone to stale performance chasing behavior by investors. These effects are attenuated if the fund is already externally visible to investors due to its size, age, or the size of the fund family.

4.4. Determinants of Stale Performance Chasing: Investor Sophistication

Our second hypothesis focuses on cross-sectional variation in stale performance chasing across investor types. Sophisticated investors should understand the mechanical influence of time on HPRs and recognize that HPR signals provide no new information in excess of the most recent return observation. We utilize two proxies for investor sophistication, drawing on Gil-Bazo and Ruiz-Verdú (2009) who show that funds with worse before-fee performance charge higher fees and Carhart (1997) and Gompers and Metrick (2001) who find that net fund return is negatively related to fund turnover. Based on these relations, *ceteris paribus,* we hypothesize that more sophisticated investors will favor funds with low fees and portfolio turnover.[18]

[18] Chalmers et al. (2011) similarly use fees and portfolio turnover to segment mutual fund investors by sophistication.

Hypothesis 2a: Funds with low relative fees and portfolio turnover are more likely to attract more sophisticated investors who recognize the value of these fund attributes. These investors are also more likely to understand the mechanical effect of time on HPR and not react to stale performance signals. Thus, low fee and low portfolio turnover funds would be expected to be associated with lower stale performance chasing.

As a second proxy for investor sophistication, we contrast retail with institutional funds (as reported in the CRSP database). Institutional funds are marketed to high net worth individuals and large pension funds managed by professionals who are often viewed as being more sophisticated than retail investors. Thus, this context provides a unique examination of the relative sophistication of institutional investors.

Hypothesis 2b: Stale performance effects will be less prominent in funds marketed to institutional investors.

The results of the investor sophistication cross-sectional tests are presented in Table VI. Focusing first on the fee and portfolio turnover sorts, we find that funds which charge higher fees and trade more frequently tend to exhibit greater flow sensitivity to stale performance signals. Across the three coefficients of interest, the expense ratio coefficient has an average t-statistic of 2.36, but the portfolio turnover relation is only marginally significant, the highest t-statistic being associated with the β_{13} coefficient (1.75). Over 1-year investment horizons, we find that investors in institutional funds are more prone to react to stale performance chasing signals (model (2) coefficient on institutional fund indicator negative with t-statistic 2.53). The relation diminishes in significance over the longer investment horizons of 3 and 5 years (t-statistic 1.49 and 1.26, respectively). Thus, we can conclude that institutional investors are as at least as prone, and are often more prone, to chase stale performance than retail investors. Our results on stale performance chasing are similar to those of Alti, Kaniel, and Yoeli (2006) who document return-chasing in an institutional subset of funds. In addition, Salganik (2012) finds no distinction in fund selection ability between retail and institutional investors.

A concern when interpreting these results is the potential relation between mutual fund fee and turnover levels and the advertising and market proxies utilized in Table V. For example, if funds which charge high fees also typically have greater advertising expenditures, then our proxies for the investor clientele sophistication may simply reflect advertising trends. The correlation between total advertising expenditures and expense ratios is 0.29 and is marginally significant (p-value 0.08). The correlation between 12b-1 fees, turnover, and advertising expenditures are all insignificant. These correlations suggest these variables capture unique fund characteristics. In unreported tests, we replicate the models in Table V adding expense ratio and portfolio turnover and find the same results, further verifying that our fund visibility and investor sophistication proxies are capturing unique determinants of stale performance chasing. We also implement the same series of robustness tests described in section 3.3 and find the same results.

4.5. Stale Performance Chasing Time Series Trends

We now examine time series trends in stale performance chasing. Our objective is to better understand the role of market conditions on the propensity of investors to react to stale performance. If stale performance chasing is undertaken by unsophisticated investors faced with high search costs, then periods of heightened uncertainty in financial markets should relate to higher flow sensitivity to stale performance chasing signals. We base this hypothesis on the findings of Sirri and Tufano (1998) and others who show that less sophisticated investors make allocation decisions based on raw as opposed to market or risk adjusted returns. Thus, during market downturns and periods of uncertainty, search costs increase as identification of a positive performing fund on a raw basis becomes more difficult.

Hypothesis 3a: During periods of heightened investor uncertainty in financial markets, search costs increase and investors become more likely to react to non-informative stale performance chasing signals.

Hypothesis 3b: Advertising acts to reduce search costs. During periods of heightened investor uncertainty in financial markets, funds which advertise HPR results should realize incremental greater flow sensitivity to stale performance chasing signals.

As proxies for financial market conditions we use: 1) the VIX volatility index maintained by the Chicago Board Option Exchange and 2) National Activity Index (CFNAI) produced by the Chicago Federal Reserve. Our motivation for the selection of these proxies is to include salient, real economy proxies easily observable by retail investors. CFNAI is the first principal component of 85 monthly series that come from the broad categories of production and income, employment and hours, consumption and housing, and sales, orders and inventories. It includes most of the series we would think of as being important indicators of current economic conditions (e.g. industrial production and unemployment). Similarly, the VIX captures implied volatility amongst the S&P 500 index constituent firms which proxies for aggregate financial market uncertainty.

The results of the time series determinants of stale performance chasing appear in Table VII. Focusing first on the economic condition proxy regressions, during periods of financial market uncertainty (high values of VIX), we see increased flow sensitivity to stale performance chasing signals (negative and significant coefficient on VIX in all models). Similarly, when national market activity is low (small values of CFNAI) we observe increased flow sensitivity to stale performance signals (positive and significant coefficient on CFNAI in the same models).

When we augment the model to include expenditures on advertising HPR information, the base coefficients remain significant. The coefficients on the interaction of fund specific advertising which includes HPR results with the financial market condition proxies are negative and generally significant (with marginal significance on the CFNAI interaction term in the β_{61}

models). The coefficients on the interaction of fund specific advertising without HPR data with the financial market condition proxies are all insignificant. To summarize these results, in times of uncertainty in financial markets, investors are more likely to respond to non-informative stale performance chasing signals and these effects are incrementally more pronounced for funds which advertise HPR results during times of stress in financial markets. Here again, we implement the same series of robustness tests and our conclusions are unaffected.

4.6. Mutual Fund Fees and Stale Performance Chasing

Our final analysis examines the implications of stale performance chasing for investors. To an extent, some of the implications of stale performance chasing behavior are already well understood. Regardless of whether investors are reacting to contemporaneous or lagged performance signals, as shown by Berk and Green (2004) and Chen et al. (2004), as assets under management expand, economies of scale diminish resulting in a decline in performance with fund size. Lou (2012) similarly documents significant and temporary price impacts of flow-induced trading across mutual funds, which reverse in subsequent years. However, other implications may exist beyond scale effects. Mutual fund fees are set in a competitive environment. Funds that wish to increase fees are likely to time the increase to special situations. For example, Bris, Gulen, Kadiyala, and Rau (2006) show that mutual funds choose to raise fees at points in time when they close their funds to new investors. Thus, beyond the understood performance implications, stale performance chasing may provide mutual funds with the opportunity to increase fees, in essence cashing in on the mechanical effects of HPRs.

To test this hypothesis we relate the changes and levels of fees to our return-chasing estimates. Following Khorana et al. (2009) who examine the determinants of mutual fund fees around the world, in these models we include as controls: 1) fund and family-level visibility proxies including size, age and the number of funds in the family, 2) fund and family flow and performance as funds and fund families with stronger performance and asset inflows are in a stronger competitive position to charge higher fees, 3) fund fees and the change in fees as the fee level and trend may influence the ability of the fund to change fees, 4) fund flow standard deviation as a proxy for fund value uncertainty and 5) the aggregate TNA of the funds in the same objective classification as a proxy for the level of competition between funds with a given management strategy. Fund and family performance is measured using Fama and French (1993) 4-factor alphas, with family performance measured as the average alpha to all equity funds in the family. The results are reported in Table VIII.

We relate mutual fund fees to stale performance chasing using two approaches. First, using a logit model (Panel A), we relate an indicator variable which is set to 1 in years in which fees increase or decrease and is otherwise set to zero. Second, in an OLS models (Panel B), we relate the fee level, the change in the dollar value of fees or fee waivers to the stale performance chasing estimates and control variables. We utilize two return-chasing measures. The first is calculated as in equation (2) using fund return in excess of the objective value-weighted mean return (*Excess* β_n). The second is calculated by relating aggregate flow to all funds in objective j to the objective j value-weighted mean return (*Objective* β_n). These separate return-chasing measures allow us to differentiate between idiosyncratic and objective based return-chasing effects of fees. Focusing first on the logit models with the fee increase indicator as the dependent variable (models (1) – (3)), both the stale performance chasing coefficients (*Excess and Objective* β_n for n=13, 37, and 61) are negative and significant in all three models (average t-statistic 3.14 and 2.36, respectively). As a more negative value of β_n reflects greater return-chasing, this implies that on average across the three models, a 1 standard deviation increase in stale performance chasing (proxied by *Excess* β_n) results in an 20% increase in the likelihood of a fee increase. Turning to the control variables, strong family and fund level performance and positive asset inflows are predictive of greater likelihoods of fee increases. Funds with high fee levels are less likely to increase fees but funds which have increased fees in the prior year are more likely to increase fees in the current year. Funds with greater value uncertainty (flow standard deviation) are less likely to increase fees, as are larger funds and funds from larger fund families.

Turning to the logit models with a fee decrease indicator as the dependent variable (models (4) – (6)), we find that these relations are generally symmetric compared to fee increases, although the likelihood of fees decreasing after low stale performance chasing are higher. On average, across the 3 models, a one standard deviation decrease in stale performance chasing (proxied by *Excess* β_n) is associated with a 27% increase in the likelihood of a fee decrease. Relations to the control variables are consistent with models (1) – (3).

Turning to the OLS estimates in Panel B and focusing first on models (1) – (3), we find largely similar results. Funds with higher return-chasing in the prior period typically charge higher fees as a percentage of TNA. On average, a 1 standard deviation increase in return-chasing (*Excess* β_n) across the three models is associated with a 10.5% increase in fees. A joint 1 standard deviation shift in *Excess* β_n and *Objective* β_n is associated with a 20.1% increase in fees.

We next examine the mechanism by which these fee increases are realized. One channel may be via economies of scale, given that the dependent variable in the first 3 models is fees as a percentage of TNA. An increase in TNA while holding total expenses constant may result in the perception of fee decreases. To control for denominator effects, we replicate the first three models, utilizing the change in the dollar value of fees as an alternative dependent variable and find the same results (models (4) – (6)). In other words, on the heels of stale performance chasing motivated flow, funds increase the dollar value of total fees (negative and significant coefficients on *Excess* β_n and *Objective* β_n).

Finally, although contractual fees are typically time invariant and may only be changed with shareholder consent, mutual funds routinely voluntarily waive fees during periods of poor performance in order to retain performance-sensitive investors (Christoffersen, 2001). To test this channel, we obtain fee waiver data from Morningstar, which reports the percentage of TNA waived from fees in a given year. We then relate the change in waived fees to the stale performance chasing estimates and control variables (models (7) to (9)). The stale performance chasing coefficients are all positive and significant, suggesting that funds *reduce* waived fees on the heels of stale performance chasing flow. The absolute sizes of the coefficient estimates across the model sets are highly similar, suggesting that adjustment to waivers explains the majority of the change in fees associated with stale performance chasing. Thus, our results suggest a channel by which managers are able to realize opportunities to return fees to prior levels without having to generate exceptional returns, i.e. by waiting for mechanical increases in HPRs realized as time passes. Briefly examining the control variables, funds and fund families with higher alphas, higher Morningstar ratings, higher flow and lower flow standard deviation typically charge higher fees. Larger fund families also typically charge lower fees.

To summarize these results, we document a channel by which mutual funds exploit naïve investors, benefiting from their inability to differentiate between the stale and current information components which jointly influence the change in HPR. Stale return-chasing creates artificial demand for the fund by naïve investors, creating opportunities for revocation of previously offered fee waivers. The resultant realized fee increase harms current investors who pay higher fees to hold the same fund. Quantifying harm to naïve investors who are enticed to purchase the fund via uninformative persuasion is more difficult, as the counterfactual performance of the investment they would have alternatively held cannot be observed. Unreported results suggest that the performance of funds which realize high stale return-chasing is not significantly different from other funds, after controlling for fees, fund size and portfolio turnover (all on average underperform the market). Regardless, new investors also pay higher fees to hold the same fund. As previously discussed, all holders of the fund become exposed to greater diseconomies of scale and the related drag on performance.

5. Conclusions

In this paper, we investigate if selective information disclosure and the form of disclosure affect investor fund flows into mutual fund. Specifically, we examine changes in reported HPR values in mutual fund advertisements. These changes in HPR values are influenced by the magnitude of both the return which is added and the end-return which is dropped from the sample when the new HPR is calculated. Thus, as time passes, prior poor performance mechanically drops from the HPR sample, giving a perception of improved fund performance.

Our analysis broadly suggests that investors fail to recognize this mechanical feature of HPRs, allocating a disproportionate amount of wealth to funds with positive stale performance. This relation is asymmetric. Funds with positive stale performance attract net inflows while no significant relation exists between negative stale performance and mutual fund flow. The irrationality of this behavior is dependent on the availability of return information which would allow investors to disentangle the portion of the change in the HPR resulting from the new information in the recent return, relative to the stale information in the lagged return which drops from the sample.

Stale performance chasing is more pronounced in fund families that advertise HPR information and amongst funds more likely held by less sophisticated investors (such as high fee funds). Stale performance chasing is also more prevalent during periods of stress in financial markets and fund families that advertise HPR information during these periods realize incrementally greater stale performance chasing behaviour.

Finally, we show that mutual funds appear to time fee increases to coincide with periods of stale performance, taking advantage of unsophisticated investors who do not appreciate the mechanical effect of time on HPRs. Our results suggest that the form in which mutual fund performance is advertised to investors is important in influencing investor behavior. As such, it adds to the body of literature documenting the importance of disclosure form (Hirshleifer and Teoh, 2003) in influencing behavior.

Appendix
Mutual Fund Advertising Data Description

Mutual fund advertising data was obtained from Kantar Media, an advertising consulting firm which maintains a detailed and comprehensive record of U.S. advertising across all mediums as part of its consulting services. Similar datasets have been utilized by Reuter and Zitzewitz (2006) and Gallaher et al. (2008) supplied by Competitive Media Research (CMR) which was subsequently acquired by Kantar Media. The mutual fund advertising data set commences in January 2005 and concludes in December 2011 and reports monthly advertising expenditures by mutual fund company in all print media (magazines and newspapers) where advertising expenditures are estimated based on the periodical, advertisement size and location in the periodical. Reuter and Zitzewitz (2006) report that these estimates differ from figures reported in parent company 10-K filings by less than 10%.[19]

Our dataset is unique, as in addition to advertising expenditure estimates, the Kantar Media dataset includes a PDF copy of each magazine advertisement; PDF copies of newspaper advertisements are not available. Mutual fund parent companies undertake a broad range of advertising, not all of which is directly mutual fund related. For example, total magazine advertising expenditures by Vanguard Group Inc. (the parent company for Vanguard Funds) from 2005 to 2011 was 71.8 million dollars, only 52% of which focused on mutual funds or ETFs, the remainder promoted general investment products (14%), investment services (26%), IRAs (5%) and retirement planning (3%). Prior analysis conducted with the CMR dataset is unable to make the distinction between mutual fund directed advertising and general advertising by the parent company which promotes other offered products and services.

[19] As our mutual fund dataset concludes in 2010, only the 2005 to 2010 portion of the advertising dataset is utilized in the paper.

We partition the advertising data as follows. Kantar Media categorizes each advertisement in the database based on a proprietary system. In this system, ads in the mutual fund category were required to specifically mention only mutual funds or exchange traded funds. If the ad featured multiple products or services (or a non-mutual fund product or service) the ad is categorized as general investment products or services or another similar category. Thus, focusing on advertisements in the mutual fund category would systematically exclude all non-mutual fund advertising undertaken by parent companies. An alternative approach to utilizing the ad categories to identify mutual fund advertising would have been to undertake a company level search in the database, using the mutual fund parent company list from CRSP. However, since we would have been reliant on Kantar Media staff to undertake this search, we considered the potential for error high, given the variation in parent company names between the CRSP and Kantar Media datasets.

To define an initial set of advertisements that contains all mutual fund advertising, we start with the broad category of financial services as defined by Kantar Media. This category of advertisers includes 65 subcategories such as banks, credit card companies, mutual funds, investment services firms, loan and credit agencies, ATM networks, financial exchanges and retirement services. To ensure the dataset provided by Kantar Media is manageable in size, we exclude advertisements which focus on credit cards, consumer or business banking, consumer loan/credit products and services, accounting and auditing services, ATM networks, credit counselling, legal announcements and financial exchanges and boards of trade (41 subcategories in total) and obtain all print media advertising for the remaining 24 subcategories.

Focusing on the magazine ads for which PDF copies are provided, the classification of each ad was validated and the following sub-classifications were applied:

1. All advertising not focused on investment products or services was excluded. These were typically investment banking related advertisements which Kantar Media classified as general investment services. An exception which we retained was sponsorship related advertising, which did not promote any specific product or service but was intended to increase brand recognition and brand value via association with an event.
2. Each advertisement was then classified whether it focused on mutual funds or another investment product or service. If a specific characteristic or attribute of mutual funds or the management ability of the fund family were mentioned in the ad, we considered this mutual fund focused. Ads which mentioned mutual funds as one of several services offered by the firm, with no mutual fund specific related advertising, were classified as a non-mutual fund specific ad. It was rare for an ad to mention specific attributes of two services such as mutual funds and retirement planning. Ads were either general in nature or focused on one service or product.
3. The mutual fund focused advertising was then classified whether specific funds were mentioned by name and whether holding period returns were reported in the ad (examples appear in Figure 2). To be classified as a holding period return advertisement, actual return values had to be reported. If the ad made a general reference to outperforming a benchmark over a given timeframe, this was not considered a holding period return ad. In the process of categorizing the holding period return ads, we noted that all funds followed the standardized reporting timeframes of 1, 3, 5, and 10 years. An exception was very young funds which reported holding period returns since inception.

The advertising and CRSP datasets were linked through visual inspection utilizing the name identifiers in each dataset and the mutual funds that appear in each ad (where given). Advertising by firms not included in the CRSP dataset were excluded. The dataset linkages were validated utilizing online resources posted by each firm. The Kantar Media classifications were found to be highly accurate. A small number of ads were reclassified (less than 10) but these revisions were more a matter of opinion than clear errors. The accuracy of the Kantar Media classifications gives us confidence that no mutual funds ads were missed by relying on their initial classifications to identify the initial set of ads for consideration.

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Table I
Stale Performance Chasing Coefficients

This table reports the return-chasing coefficient (β_n) from the series of 60 separate regressions: $Flow_t = \alpha + \beta_1 Return_{t-1} + \beta_n Return_{t-n} + \varepsilon_{t,}$ for all values of *n* from 2 to 61, where flow is the percentage growth in mutual fund total net assets (TNA), defined as: $TNA_{i,t} - TNA_{i,t-1} \times (1+Return_{i,t})/TNA_{i,t-1}$ in month *t* for fund *i*. The sample includes all domestic, actively managed mutual funds in the U.S. between 1992 and 2010. Return coefficients coinciding with the end of commonly reported holding period returns (1, 3, and 5 years) appear in bold face. β_n coefficient values are reported with associated t-statistics from the regression. The t-statistic for the test H_o: absolute β_{13} or β_{37} or β_{61} = average absolute β_n from the 60 regressions are also reported. We estimate two separate model series, Panel A summarizes coefficient output using raw fund returns as the independent variable and Panel B does the same using fund returns in excess of the value-weighted mean fund objective return as the independent variable. In Panel C coefficient values are estimated simultaneously in one pooled model. Panel D reports robustness test. Estimates from Panel A of Table I are reported in the first row for ease of comparison (Model 1). The robustness models include replicating the tests but clustering standard errors by year and fund (Model 2) and by month (Model 3). Models (4) to (7) report coefficient estimates utilizing the change in market share N-SAR, N-SAR flow, N-SAR sales and N-SAR redemptions as alternative dependent variables in the model. In the interest of brevity, in Panel D only coefficient estimates for the variables of interest from Panel A (R_{t-13}, R_{t-37}, R_{t-61}) are reported.

Panel A: Raw Returns

	R_{t-2}	R_{t-3}	R_{t-4}	R_{t-5}	R_{t-6}	R_{t-7}	R_{t-8}	R_{t-9}	R_{t-10}	R_{t-11}	R_{t-12}	**R_{t-13}**
Coef.	0.11	0.09	0.14	0.09	-0.22	0.23	0.09	0.21	0.08	0.10	-0.20	**-0.28**
Reg. t-stat	1.42	1.37	2.28	1.15	3.06	2.81	1.21	3.31	1.35	1.70	3.09	**3.59**
Diff. t-stat	0.58	0.99	0.24	0.83	0.91	0.92	0.87	0.87	1.26	0.93	0.70	**1.67**

	R_{t-14}	R_{t-15}	R_{t-16}	R_{t-17}	R_{t-18}	R_{t-19}	R_{t-20}	R_{t-21}	R_{t-22}	R_{t-23}	R_{t-24}	R_{t-25}
Coef.	-0.21	0.08	0.10	0.23	-0.23	0.14	0.11	0.11	-0.18	-0.09	-0.18	-0.27
Reg. t-stat	3.03	1.70	1.40	3.12	2.89	2.04	1.71	1.82	2.88	1.95	2.75	1.93
Diff. t-stat	0.80	0.59	0.77	1.02	0.95	0.21	0.70	0.74	0.40	1.40	0.39	0.86

	R_{t-26}	R_{t-27}	R_{t-28}	R_{t-29}	R_{t-30}	R_{t-31}	R_{t-32}	R_{t-33}	R_{t-34}	R_{t-35}	R_{t-36}	**R_{t-37}**
Coef.	0.09	0.19	0.12	0.15	0.08	0.12	0.15	0.01	-0.01	-0.21	-0.21	**-0.38**
Reg. t-stat	1.75	2.50	1.60	2.40	1.19	2.04	2.73	0.18	0.35	2.14	2.19	**3.29**
Diff. t-stat	1.26	0.46	0.46	0.08	1.11	0.59	0.09	0.26	0.51	0.56	0.58	**1.99**

	R_{t-38}	R_{t-39}	R_{t-40}	R_{t-41}	R_{t-42}	R_{t-43}	R_{t-44}	R_{t-45}	R_{t-46}	R_{t-47}	R_{t-48}	R_{t-49}
Coef.	-0.22	-0.16	0.11	0.09	0.14	-0.20	-0.18	-0.23	0.11	0.18	0.11	-0.19
Reg. t-stat	2.87	2.74	1.69	1.29	2.57	2.81	2.54	3.01	1.78	2.72	1.62	2.45
Diff. t-stat	0.85	0.09	0.69	0.93	0.27	0.64	0.36	0.98	0.72	0.38	0.66	0.52

	R_{t-50}	R_{t-51}	R_{t-52}	R_{t-53}	R_{t-54}	R_{t-55}	R_{t-56}	R_{t-57}	R_{t-58}	R_{t-59}	R_{t-60}	**R_{t-61}**
Coef.	0.13	0.11	0.19	0.08	0.19	0.09	-0.13	-0.20	-0.13	0.18	0.12	**-0.28**
Reg. t-stat	1.56	1.51	2.43	1.49	2.58	1.69	1.88	2.97	1.75	2.77	1.11	**3.55**
Diff. t-stat	0.30	0.61	0.45	1.39	0.48	1.22	0.36	0.67	0.33	0.39	0.32	**1.65**

Panel B: Excess Returns

	R_{t-2}	R_{t-3}	R_{t-4}	R_{t-5}	R_{t-6}	R_{t-7}	R_{t-8}	R_{t-9}	R_{t-10}	R_{t-11}	R_{t-12}	**R_{t-13}**
Coef.	0.15	0.11	0.14	0.10	-0.27	0.22	0.10	0.20	0.06	0.11	-0.24	**-0.34**
Reg. t-stat	1.57	1.39	2.21	1.31	3.69	2.77	1.32	2.72	0.93	1.40	3.41	**3.86**
Diff. t-stat	0.62	0.53	0.19	0.68	1.61	0.85	0.69	0.65	1.43	0.54	1.25	**2.16**

	R_{t-14}	R_{t-15}	R_{t-16}	R_{t-17}	R_{t-18}	R_{t-19}	R_{t-20}	R_{t-21}	R_{t-22}	R_{t-23}	R_{t-24}	R_{t-25}
Coef.	-0.16	0.08	0.10	0.17	-0.23	0.15	0.11	0.13	-0.15	-0.08	-0.15	-0.19
Reg. t-stat	2.46	1.21	1.32	2.69	3.37	2.28	1.64	1.74	2.28	1.18	2.32	2.49
Diff. t-stat	0.12	1.09	0.69	0.28	1.14	0.03	0.63	0.30	0.03	1.07	0.03	0.52

	R_{t-26}	R_{t-27}	R_{t-28}	R_{t-29}	R_{t-30}	R_{t-31}	R_{t-32}	R_{t-33}	R_{t-34}	R_{t-35}	R_{t-36}	**R_{t-37}**
Coef.	0.11	0.17	0.14	0.16	0.09	0.15	0.13	0.01	-0.01	-0.17	-0.23	**-0.38**
Reg. t-stat	1.47	2.50	1.79	2.43	1.29	2.28	1.74	0.17	0.31	2.57	3.39	**3.96**
Diff. t-stat	0.56	0.26	0.16	0.12	0.89	0.03	0.30	0.24	0.44	0.27	1.15	**2.40**

	R_{t-38}	R_{t-39}	R_{t-40}	R_{t-41}	R_{t-42}	R_{t-43}	R_{t-44}	R_{t-45}	R_{t-46}	R_{t-47}	R_{t-48}	R_{t-49}
Coef.	-0.22	-0.14	0.09	0.08	0.14	-0.23	-0.14	-0.19	0.11	0.17	0.11	-0.14
Reg. t-stat	2.82	1.83	1.23	0.93	2.05	3.20	1.77	2.70	1.45	2.47	1.39	2.02
Diff. t-stat	0.87	0.16	0.85	0.84	0.18	1.08	0.15	0.54	0.56	0.26	0.53	0.14

	R_{t-50}	R_{t-51}	R_{t-52}	R_{t-53}	R_{t-54}	R_{t-55}	R_{t-56}	R_{t-57}	R_{t-58}	R_{t-59}	R_{t-60}	**R_{t-61}**
Coef.	0.12	0.12	0.14	0.08	0.18	0.09	-0.16	-0.21	-0.15	0.21	0.11	**-0.31**
Reg. t-stat	1.64	1.71	1.89	1.19	2.69	1.25	2.43	2.73	2.23	2.73	1.52	**3.60**
Diff. t-stat	0.44	0.46	0.16	1.07	0.42	0.86	0.12	0.75	0.03	0.75	0.58	**1.86**

Panel C: Excess Returns (All Lags Simultaneously)

	R_{t-2}	R_{t-3}	R_{t-4}	R_{t-5}	R_{t-6}	R_{t-7}	R_{t-8}	R_{t-9}	R_{t-10}	R_{t-11}	R_{t-12}	**R_{t-13}**
Coef.	0.13	0.11	0.16	-0.11	-0.33	-0.27	0.10	0.19	-0.05	0.09	-0.26	**-0.41**
Reg. t-stat	2.02	1.71	2.26	1.62	3.89	3.53	1.30	2.73	0.74	1.23	3.28	**4.59**
Diff. t-stat	0.28	0.59	0.12	0.58	2.12	1.58	0.75	0.60	1.46	0.89	1.40	**2.90**

	R_{t-14}	R_{t-15}	R_{t-16}	R_{t-17}	R_{t-18}	R_{t-19}	R_{t-20}	R_{t-21}	R_{t-22}	R_{t-23}	R_{t-24}	R_{t-25}
Coef.	0.17	0.06	0.08	-0.16	-0.19	-0.14	0.09	0.13	0.12	0.06	-0.12	-0.17
Reg. t-stat	2.43	0.94	1.14	2.33	2.54	2.14	1.22	2.05	1.84	1.00	1.92	2.50
Diff. t-stat	0.24	1.31	1.04	0.16	0.54	0.14	0.92	0.25	0.50	1.38	0.43	0.35

	R_{t-26}	R_{t-27}	R_{t-28}	R_{t-29}	R_{t-30}	R_{t-31}	R_{t-32}	R_{t-33}	R_{t-34}	R_{t-35}	R_{t-36}	**R_{t-37}**
Coef.	-0.14	0.15	0.13	-0.15	-0.09	0.12	0.11	-0.01	-0.01	0.14	-0.22	**-0.38**
Reg. t-stat	2.05	2.23	2.02	2.17	1.23	2.00	1.44	0.11	0.12	2.06	2.97	**3.98**
Diff. t-stat	0.22	0.04	0.25	0.03	0.84	0.43	0.60	1.56	1.38	0.16	0.94	**2.41**

	R_{t-38}	R_{t-39}	R_{t-40}	R_{t-41}	R_{t-42}	R_{t-43}	R_{t-44}	R_{t-45}	R_{t-46}	R_{t-47}	R_{t-48}	R_{t-49}
Coef.	0.19	0.17	0.07	0.10	0.15	-0.18	-0.15	0.23	0.12	-0.16	-0.12	-0.12
Reg. t-stat	2.60	2.39	1.07	1.42	2.24	2.50	2.17	3.15	1.97	2.30	1.89	2.01
Diff. t-stat	0.56	0.22	1.11	0.79	0.04	0.38	0.01	1.12	0.44	0.14	0.44	0.41

	R_{t-50}	R_{t-51}	R_{t-52}	R_{t-53}	R_{t-54}	R_{t-55}	R_{t-56}	R_{t-57}	R_{t-58}	R_{t-59}	R_{t-60}	**R_{t-61}**
Coef.	-0.10	-0.14	0.17	0.06	0.22	0.08	0.16	0.22	-0.11	0.21	-0.11	**-0.30**
Reg. t-stat	1.43	2.17	2.47	0.93	2.82	1.08	2.29	3.11	1.81	2.80	1.54	**3.77**
Diff. t-stat	0.66	0.11	0.27	1.34	0.86	1.03	0.14	1.03	0.56	0.77	0.60	**1.87**

Panel D: Robustness Tests

Model	Data Source	R_{t-13}	R_{t-37}	R_{t-61}
(1)	CRSP No Clustering (Table I, Panel A)	-0.28	-0.38	-0.28
		(3.59)	(3.29)	(3.55)
(2)	CRSP Cluster by Year and Fund	-0.28	-0.38	-0.28
		(3.61)	(3.98)	(3.74)
(3)	CRSP Cluster by Month	-0.28	-0.38	-0.28
		(2.70)	(3.99)	(3.85)
(4)	N-SAR Flow	-0.34	-0.39	-0.41
		(3.80)	(3.89)	(3.99)
(5)	N-SAR Sales	-0.29	-0.36	-0.34
		(3.36)	(3.67)	(3.22)
(6)	N-SAR Redemptions	0.23	0.37	0.24
		(3.59)	(3.85)	(3.59)
(7)	CRSP Market Share	-0.33	-0.43	-0.28
		(4.08)	(3.70)	(3.58)

Table II
Return-chasing Asymmetry

In this table, the dependent variable is the percentage growth in mutual fund total net assets (TNA), defined as: $TNA_{i,t} - TNA_{i,t-1} \times (1+Return_{i,t})/TNA_{i,t-1}$ in month *t* for fund *i*. The sample includes all domestic, actively managed mutual funds in the U.S. between 1992 and 2010. Independent variables include the return to fund *i* in *t-1*and the fractional rank of the return to fund *i* in month *t-n* for three values of *n*, 13, 37, and 61, considered in separate regressions. The fractional return ranks are calculated as in Sirri and Tufano (1998) where a fund's rank represents its percentile performance relative to other funds in the same objective classification. The ranks are estimated using a piecewise linear regression framework over five quintiles.

	Dependent Variable: $Flow_t$					
	n=13		*n*=37		*n*=61	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-0.27	-0.38	-0.07	-0.26	-0.64	-0.81
	(2.52)	(2.75)	(0.33)	(1.97)	(2.75)	(3.23)
$Return_{t-1}$	0.35	0.33	0.23	0.19	0.27	0.22
	(2.96)	(2.78)	(2.83)	(2.15)	(3.42)	(3.10)
Breakdown of Rank						
Top $Return_{t-n}$ Quintile	-0.01	-0.02	-0.01	-0.02	-0.01	-0.03
	(1.37)	(1.53)	(1.22)	(1.33)	(1.26)	(1.53)
2^{nd} $Return_{t-n}$ Quintile	-0.01		-0.01		-0.02	
	(1.24)		(1.00)		(1.52)	
2^{nd}-4^{th} $Return_{t-n}$ Quintile		-0.15		-0.18		-0.21
		(3.42)		(3.54)		(3.87)
3rd $Return_{t-n}$ Quintile	-0.04		-0.02		-0.08	
	(1.61)		(1.43)		(1.79)	
4^{th} $Return_{t-n}$ Quintile	-0.10		-0.17		-0.19	
	(2.30)		(2.03)		(2.86)	
Bottom $Return_{t-n}$ Quintile	-0.32	-0.43	-0.26	-0.38	-0.30	-0.45
	(4.15)	(4.51)	(3.47)	(3.77)	(3.82)	(5.34)
Adjusted R^2	0.26	0.24	0.27	0.26	0.29	0.27

Table III
Advertising Expenditure Dataset Summary Statistics

This table summarizes investment company advertising expenditures in print media in the U.S. by year (thousand USD). Expenditures are segmented between magazine and newspaper advertisements. Magazine advertisement expenditures are subsequently segmented by whether the advertisement promotes mutual funds or promotes another product or service provided by the mutual fund company. Expenditures focused on mutual fund advertising are subsequently segmented by: 1) expenditures that promote a specific fund relative to broad family based promotion and 2) expenditures which promote holding period returns (HPR). Greater detail regarding the establishment of the partitions is provided in the Appendix.

	2005	2006	2007	2008	2009	2010	Total	% of Total
				All Advertising				
Newspaper	61,427	58,794	89,764	96,690	103,630	126,881	537,186	34
Magazine	148,643	169,341	184,043	213,006	147,315	182,969	1,045,317	66
Total	210,070	228,135	273,807	309,696	250,945	309,850	1,582,503	
				Magazine Advertising				
Not Mutual Fund Focused	84,061	96,872	110,181	149,840	123,985	147,823	712,762	68
Mutual Fund Focused	64,582	72,469	73,862	63,166	23,330	35,146	332,555	32
				Mutual Fund Focused Magazine Advertising				
Fund Specific	49,869	52,658	54,202	39,008	15,517	18,212	229,466	69
Family	14,713	19,811	19,660	24,158	7,813	16,934	103,089	31
				Fund Specific Magazine Advertising				
Advertise HPR	26,899	20,873	15,773	8,641	1,615	2,044	75,845	33
Do Not Advertise HPR	22,970	31,785	38,429	30,367	13,902	16,168	153,621	67

Table IV
Determinants of Holding Period Return Advertising Expenditures

In this table, the dependent variable is the change in spending on fund specific advertising which features holding period return data in year *T*. The independent variables are holding period returns (HPR) calculated using monthly returns over the prior 1, 3, and 5 year horizons (for example, $HPR_{T-1}^{3\,Year}$ refers to the 3 year HPR ending in year *T*-1), the logarithm of: fund total net assets (TNA), fund age measured from the date of fund inception to the start of the year of β_n estimation, # of funds offered by the investment company (family) of the fund and total family TNA. Fund flow is the percentage growth in mutual fund TNA, defined as: $TNA_{i,t} - TNA_{i,t-1} \times (1+Return_{i,t})/TNA_{i,t-1}$ in month *t* for fund *i*. Fund flow standard deviation is calculated using monthly fund flow over the prior year. Market return is the return to the S&P 500 index. Expense ratio, front end load, back end load and portfolio turnover are calculated as TNA weighted mean values across all available share classes of each fund. Expense ratio and turnover for each share class is the percentage of TNA charged as operating expenses and the percentage of TNA traded per annum, respectively. Morningstar rating is the number of stars (1 to 5) assigned to the fund in Morningstar's fund rating system. The regressions include time fixed effects. Standardized coefficient values are reported with t-statistics in parentheses calculated with standard errors clustered by fund.

Dependent Variable	Δ Spending on advertising featuring HPR information $_T$										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
$HPR_{T-1}^{1\,Year}$	0.17			0.20	0.16	0.14	0.18	0.15	0.14	0.16	0.12
	(2.30)			(2.96)	(2.53)	(1.93)	(2.56)	(2.97)	(2.17)	(2.56)	(2.57)
$HPR_{T-1}^{3\,Year}$		0.23		0.24		0.19	0.20		0.21	0.24	
		(3.38)		(3.62)		(2.82)	(3.27)		(2.91)	(3.55)	
$HPR_{T-1}^{5\,Year}$			0.35		0.19	0.16		0.18	0.15		0.13
			(4.14)		(2.75)	(2.52)		(2.85)	(2.27)		(2.74)
$HPR_{T-1}^{1\,Year} \times HPR_{T-1}^{3\,Year}$							0.30				
							(4.04)				
$HPR_{T-1}^{1\,Year} \times HPR_{T-1}^{5\,Year}$								0.26			
								(3.99)			
$HPR_{T-1}^{1\,Year} \times HPR_{T-1}^{3\,Year} \times HPR_{T-1}^{5\,Year}$									0.35		
									(4.59)		
$HPR_{T-4}^{1\,Year}$										-0.08	
										(1.50)	
$HPR_{T-6}^{1\,Year}$											-0.12
											(1.95)
$1/HPR_{T-4}^{1\,Year} \times HPR_{T-1}^{3\,Year}$										0.28	
										(2.92)	
$1/HPR_{T-6}^{1\,Year} \times HPR_{T-1}^{5\,Year}$											0.32
											(4.28)
Log Fund TNA $_{T-1}$	0.26	0.33	0.25	0.33	0.29	0.32	0.37	0.34	0.35	0.37	0.37
	(3.77)	(4.13)	(3.21)	(3.85)	(4.02)	(4.09)	(4.58)	(4.24)	(4.03)	(4.60)	(4.17)
Log Family TNA $_{T-1}$	0.23	0.12	0.17	0.12	0.14	0.12	0.09	0.15	0.13	0.12	0.14
	(3.17)	(1.77)	(2.23)	(2.42)	(2.27)	(2.52)	(2.23)	(2.07)	(2.62)	(2.34)	(2.79)

Fund Flow $_{T-1}$	-0.14	-0.18	-0.17	-0.18	-0.13	-0.12	-0.15	-0.12	-0.10	-0.10	-0.12
	(1.86)	(2.91)	(2.85)	(2.40)	(2.27)	(1.75)	(2.26)	(2.66)	(1.95)	(1.99)	(1.99)
Log Fund Age $_{T-1}$	-0.11	-0.14	-0.14	-0.11	-0.15	-0.15	-0.09	-0.14	-0.13	-0.18	-0.15
	(2.21)	(2.20)	(2.50)	(1.71)	(2.89)	(2.28)	(1.85)	(2.30)	(2.54)	(2.91)	(2.74)
Fund Flow St. Deviation $_{T-1}$	0.29	0.25	0.23	0.21	0.24	0.23	0.17	0.25	0.26	0.21	0.20
	(3.91)	(3.91)	(3.20)	(2.92)	(3.74)	(3.09)	(2.38)	(3.26)	(3.73)	(3.26)	(3.40)
Market Return $_{T-1}$	0.16	0.14	0.14	0.12	0.11	0.12	0.13	0.10	0.13	0.12	0.13
	(2.98)	(2.32)	(2.23)	(2.44)	(2.53)	(2.57)	(2.22)	(2.11)	(2.29)	(2.15)	(2.37)
Expense Ratio $_{T-1}$	0.16	0.16	0.17	0.13	0.13	0.09	0.10	0.13	0.11	0.10	0.10
	(2.78)	(2.32)	(3.13)	(2.76)	(2.62)	(1.82)	(2.46)	(2.19)	(2.25)	(2.15)	(1.65)
Front End Load $_{T-1}$	0.25	0.21	0.33	0.17	0.17	0.26	0.18	0.14	0.32	0.25	0.24
	(3.30)	(3.41)	(4.09)	(2.50)	(3.14)	(3.22)	(2.31)	(2.65)	(4.29)	(3.61)	(3.82)
Back End Load $_{T-1}$	0.05	0.04	0.06	0.03	0.02	0.03	0.03	0.02	0.04	0.03	0.03
	(1.12)	(1.25)	(1.30)	(1.22)	(1.09)	(1.53)	(0.95)	(1.03)	(1.33)	(1.55)	(1.01)
Portfolio Turnover $_{T-1}$	0.07	0.08	0.08	0.04	0.05	0.02	0.03	0.05	0.02	0.02	0.02
	(1.45)	(1.51)	(1.52)	(1.49)	(1.89)	(0.82)	(1.67)	(1.48)	(0.73)	(0.74)	(0.90)
Morningstar Rating $_{T-1}$	0.14	0.16	0.11	0.14	0.14	0.08	0.12	0.13	0.09	0.09	0.08
	(2.50)	(2.86)	(2.32)	(2.70)	(2.14)	(2.01)	(2.66)	(2.35)	(2.01)	(1.83)	(1.72)
Adjusted R^2	0.25	0.30	0.37	0.28	0.32	0.39	0.31	0.34	0.41	0.33	0.35

Table V
Cross-sectional Determinants of Stale Performance Chasing: Fund Visibility

In this table the dependent variable is the annual frequency time series of coefficients (β_n) from the regressions: $Flow_{i,t} = \alpha_i + \beta_1 Return_{i,t-1} + \beta_n Return_{i,t-n} + \varepsilon_{i,t,}$ for n = 13, 37, 61, where flow is the percentage growth in mutual fund total net assets (TNA), defined as: $TNA_{i,t} - TNA_{i,t-1} \times (1+Return_{i,t})/TNA_{i,t-1}$ in month t for fund i estimated for each year T. Independent variables are the logarithm of: fund TNA, fund age measured from the date of fund inception to the start of the year of β_n estimation, # of funds offered by the investment company (family) of the fund and total family TNA. Fund Return and Fund Return Standard Deviation (Std) are calculated over the prior year based on the fund's monthly returns. Morningstar rating is the number of stars (1 to 5) assigned to the fund in Morningstar's fund rating system. The models in Panel A include fund family level advertising variables where: Total Ad Spending is total print media advertising expenditures by the mutual fund family. Total Ad Spending is decomposed into Newspaper and Magazine advertising expenditures. Magazine advertising expenditures are further decomposed into mutual fund and non-mutual fund focused ads and whether the mutual fund ad includes information on fund holding period returns or not. The models in Panel B include fund level advertising variables. Advertising is considered fund specific if it mentions at least one fund by name and is otherwise classified as family advertising. Fund specific advertising is subsequently partitioned by whether the fund mentions the fund of interest and if returns for the fund of interest are reported. 12b-1 is the 12b-1 fee charged by the fund. The regressions include time fixed effects. Standardized coefficient values are reported with t-statistics in parentheses. T-statistics are calculated with White (1980) heteroskedastic consistent standard errors clustered by fund. Coefficient values for the non-advertising variables are reported in Panel A and suppressed in Panel B in the interest of brevity.

Panel A: Family Level Ad Data

Dependent Variable	$\beta_{13,T}$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Fund TNA $_{T-1}$	0.31	0.41	0.61	0.61	0.52	0.50	0.35	0.83
	(4.56)	(5.58)	(7.84)	(6.72)	(6.92)	(6.82)	(4.40)	(8.71)
Log Fund Age $_{T-1}$	0.01	0.03	0.01	0.01	0.01	0.01	0.02	0.01
	(1.33)	(1.08)	(0.73)	(0.97)	(0.89)	(1.26)	(1.39)	(1.11)
Log # Funds in Family $_{T-1}$	0.03	0.06	0.05	0.04	0.06	0.05	0.06	0.06
	(1.46)	(1.36)	(1.55)	(1.24)	(1.94)	(1.34)	(1.57)	(1.61)
Log Family TNA $_{T-1}$	0.25	0.33	0.29	0.29	0.28	0.20	0.33	0.27
	(2.90)	(4.00)	(3.84)	(4.11)	(3.06)	(2.76)	(4.28)	(4.39)
Fund Return Std. $_{T-1}$	-0.33	-0.11	-0.15	-0.20	-0.14	-0.17	-0.11	-0.12
	(4.50)	(2.70)	(2.80)	(3.32)	(2.34)	(3.26)	(2.53)	(2.53)
Morningstar Rating $_{T-1}$	-0.25	-0.12	-0.11	-0.13	-0.12	-0.16	-0.12	-0.15
	(2.98)	(2.52)	(2.20)	(2.13)	(1.89)	(2.93)	(2.41)	(2.58)
Total Ad Spending $_{T-1}$		-0.25						-0.30
		(3.44)						(4.00)
Newspaper Ad Spending $_{T-1}$			-0.13					
			(2.37)					
Magazine Ad Spending $_{T-1}$				-0.35				
				(5.04)				
Non-Mutual Fund Ad Spending $_{T-1}$					-0.13	-0.13		
					(2.46)	(2.85)		
Mutual Fund Ad Spending $_{T-1}$					-0.25			
					(3.30)			
Mutual Fund Ad Spending, No HPR $_{T-1}$						-0.05		
						(1.87)		
Mutual Fund Ad Spending, HPR $_{T-1}$						-0.29	-0.22	
						(3.99)	(3.37)	
Total Ad Spending × 1/Log Fund TNA $_{T-1}$								-0.22
								(2.97)
Adjusted R^2	0.18	0.21	0.19	0.21	0.24	0.25	0.19	0.25

Dependent Variable	$\beta_{37,T}$							
	1	2	3	4	5	6	7	8
Log Fund TNA $_{T-1}$	0.45	0.33	0.23	0.39	0.18	0.16	0.39	0.15
	(6.32)	(4.55)	(3.65)	(4.22)	(2.91)	(2.51)	(4.98)	(3.02)
Log Fund Age $_{T-1}$	0.23	0.20	0.24	0.30	0.24	0.35	0.16	0.30
	(3.44)	(3.13)	(4.08)	(3.45)	(3.48)	(5.13)	(2.67)	(4.30)
Log # Funds in Family $_{T-1}$	0.03	0.05	0.01	0.01	0.01	0.01	0.03	0.01
	(1.23)	(1.36)	(1.41)	(0.96)	(0.90)	(0.90)	(1.35)	(1.05)
Log Family TNA $_{T-1}$	0.49	0.14	0.60	0.63	0.78	0.56	0.16	0.59
	(6.16)	(2.65)	(7.28)	(8.20)	(9.52)	(6.39)	(1.97)	(6.72)
Fund Return Std. $_{T-1}$	-0.15	-0.13	-0.15	-0.17	-0.17	-0.13	-0.14	-0.08
	(2.56)	(2.12)	(2.19)	(2.38)	(2.84)	(2.59)	(2.41)	(1.54)
Morningstar Rating $_{T-1}$	-0.23	-0.26	-0.18	-0.17	-0.23	-0.18	-0.15	-0.13
	(3.42)	(3.34)	(2.76)	(2.68)	(2.77)	(2.55)	(2.66)	(2.31)
Total Ad Spending $_{T-1}$		-0.25						-0.43
		(3.44)						(5.52)
Newspaper Ad Spending $_{T-1}$			-0.25					
			(4.24)					
Magazine Ad Spending $_{T-1}$				-0.37				
				(5.02)				
Non-Mutual Fund Ad Spending $_{T-1}$					-0.22	-0.19		
					(2.82)	(2.95)		
Mutual Fund Ad Spending $_{T-1}$					-0.43			
					(4.84)			
Mutual Fund Ad Spending, No HPR $_{T-1}$						-0.17		
						(2.85)		
Mutual Fund Ad Spending, HPR $_{T-1}$						-0.37	-0.37	
						(5.31)	(4.06)	
Total Ad Spending × 1/Log Fund TNA $_{T-1}$								-0.31
								(4.47)
Adjusted R^2	0.21	0.24	0.27	0.25	0.28	0.32	0.28	0.29

Dependent Variable	$\beta_{61,T}$							
	1	2	3	4	5	6	7	8
Log Fund TNA $_{T-1}$	0.18	0.27	0.60	0.48	0.31	0.54	0.19	0.36
	(3.32)	(3.69)	(5.97)	(6.53)	(4.72)	(7.05)	(3.67)	(5.76)
Log Fund Age $_{T-1}$	0.16	0.18	0.22	0.19	0.15	0.21	0.36	0.23
	(2.91)	(3.21)	(3.23)	(3.79)	(2.45)	(3.25)	(4.01)	(3.49)
Log # Funds in Family $_{T-1}$	0.04	0.03	0.02	0.02	0.03	0.02	0.02	0.02
	(1.31)	(1.09)	(1.16)	(1.33)	(1.33)	(1.24)	(1.06)	(1.32)
Log Family TNA $_{T-1}$	0.33	0.12	0.24	0.18	0.34	0.24	0.19	0.29
	(4.02)	(2.54)	(4.05)	(2.82)	(4.58)	(3.17)	(2.24)	(3.88)
Fund Return Std. $_{T-1}$	-0.28	-0.16	-0.31	-0.25	-0.28	-0.21	-0.20	-0.26
	(3.55)	(2.52)	(4.15)	(3.37)	(3.97)	(2.89)	(3.38)	(4.00)
Morningstar Rating $_{T-1}$	-0.30	-0.18	-0.25	-0.24	-0.14	-0.23	-0.28	-0.25
	(4.17)	(2.89)	(2.85)	(3.42)	(2.26)	(3.57)	(3.64)	(3.42)
Total Ad Spending $_{T-1}$		-0.20						-0.23
		(3.63)						(3.59)
Newspaper Ad Spending $_{T-1}$			-0.23					
			(3.09)					
Magazine Ad Spending $_{T-1}$				-0.27				
				(2.88)				
Non-Mutual Fund Ad Spending $_{T-1}$					-0.29	-0.18		
					(3.68)	(3.01)		
Mutual Fund Ad Spending $_{T-1}$					-0.41			
					(5.15)			
Mutual Fund Ad Spending, No HPR $_{T-1}$						-0.18		
						(2.82)		
Mutual Fund Ad Spending, HPR $_{T-1}$						-0.27	-0.38	
						(4.16)	(5.26)	
Total Ad Spending × 1/Log Fund TNA $_{T-1}$								-0.30
								(4.42)
Adjusted R^2	0.18	0.21	0.21	0.20	0.29	0.31	0.23	0.28

Panel B: Fund Level Ad Data

Dependent Variable	$\beta_{13,T}$					
	1	2	3	4	5	6
12b-1 $_{T-1}$	-0.15					-0.13
	(2.25)					(2.51)
Morningstar Rating $_{T-1}$	-0.21	-0.11	-0.16	-0.20	-0.12	-0.15
	(3.28)	(2.35)	(2.75)	(2.42)	(2.44)	(2.27)
Family Non-Mutual Fund Ad Spending $_{T-1}$		-0.09	-0.07	-0.11	-0.13	-0.15
		(1.98)	(2.02)	(2.24)	(2.07)	(2.44)
Family Mutual Fund Ad Spending $_{T-1}$		-0.11	-0.14	-0.14	-0.11	-0.17
		(1.99)	(2.18)	(2.41)	(2.11)	(2.41)
Fund Specific Ad Spending , Other Fund $_{T-1}$			-0.04	-0.05	-0.03	-0.02
			(1.53)	(1.58)	(1.51)	(1.64)
Fund Specific Ad Spending, On Fund $_{T-1}$				-0.19		
				(2.15)		
Fund Specific Ad Spending, On Fund, No HPR$_{T-1}$					-0.12	-0.15
					(2.39)	(2.70)
Fund Specific Ad Spending, On Fund, HPR $_{T-1}$					-0.22	-0.36
					(2.89)	(3.64)
Adjusted R^2	0.25	0.28	0.31	0.32	0.36	0.37

Dependent Variable	$\beta_{37,T}$					
	1	2	3	4	5	6
12b-1 $_{T-1}$	-0.20					-0.17
	(3.08)					(2.10)
Morningstar Rating $_{T-1}$	-0.27	-0.18	-0.13	-0.16	-0.23	-0.26
	(3.23)	(2.63)	(2.46)	(2.53)	(2.99)	(3.49)
Family Non-Mutual Fund Ad Spending $_{T-1}$		-0.15	-0.19	-0.32	-0.21	-0.11
		(2.95)	(2.45)	(3.66)	(3.20)	(1.91)
Family Mutual Fund Ad Spending $_{T-1}$		-0.24	-0.37	-0.35	-0.26	-0.36
		(3.57)	(4.11)	(3.50)	(4.07)	(3.72)
Fund Specific Ad Spending , Other Fund $_{T-1}$			-0.06	-0.03	-0.03	-0.04
			(1.79)	(1.20)	(1.69)	(1.09)
Fund Specific Ad Spending, On Fund $_{T-1}$				-0.33		
				(4.53)		
Fund Specific Ad Spending, On Fund, No HPR$_{T-1}$					-0.07	-0.18
					(1.76)	(2.22)
Fund Specific Ad Spending, On Fund, HPR $_{T-1}$					-0.46	-0.40
					(5.80)	(4.38)
Adjusted R^2	0.29	0.32	0.35	0.38	0.42	0.43

Dependent Variable	$\beta_{61,T}$					
	1	2	3	4	5	6
12b-1 $_{T-1}$	-0.24					-0.33
	(3.68)					(4.99)
Morningstar Rating $_{T-1}$	-0.25	-0.20	-0.22	-0.13	-0.13	-0.24
	(3.46)	(2.84)	(3.71)	(2.08)	(2.58)	(2.85)
Family Non-Mutual Fund Ad Spending $_{T-1}$		-0.17	-0.16	-0.22	-0.20	-0.14
		(2.59)	(3.03)	(4.04)	(4.39)	(2.25)
Family Mutual Fund Ad Spending $_{T-1}$		-0.28	-0.25	-0.25	-0.27	-0.42
		(4.19)	(4.73)	(4.14)	(3.98)	(4.59)
Fund Specific Ad Spending , Other Fund $_{T-1}$			-0.04	-0.03	-0.02	-0.02
			(1.05)	(1.61)	(0.93)	(1.40)
Fund Specific Ad Spending, On Fund $_{T-1}$				-0.36		
				(4.74)		
Fund Specific Ad Spending, On Fund, No HPR$_{T-1}$					-0.15	-0.12
					(3.48)	(2.35)
Fund Specific Ad Spending, On Fund, HPR $_{T-1}$					-0.42	-0.28
					(5.27)	(3.73)
Adjusted R^2	0.31	0.32	0.34	0.38	0.41	0.43

Table VI

Cross-sectional Determinants of Stale Performance Chasing: Investor Sophistication

In this table the dependent variable is the annual frequency time series of coefficients β_n from the regressions: $Flow_{i,t} = \alpha_i + \beta_1 Return_{i,t-1} + \beta_n Return_{i,t-n} + \varepsilon_{i,t,}$ for n = 13, 37, 61, where flow is the percentage growth in mutual fund total net assets TNA, defined as: $TNA_{i,t} - TNA_{i,t-1} \times 1 + Return_{i,t} / TNA_{i,t-1}$ in month t for fund i estimated for each year T. Independent variables are the logarithm of: fund TNA, fund age measured from the date of fund inception to the start of the year of β_n estimation, # of funds offered by the investment company family of the fund and total family TNA. Fund Return Standard Deviation Std is calculated over the prior year based on the fund's monthly returns. Morningstar rating is the number of stars 1 to 5 assigned to the fund in Morningstar's fund rating system. Portfolio turnover is the percentage of average total net assets traded in year t. Expense ratio is percentage of total net assets which investors pay for the fund's operating expenses. Institutional fund is an indicator variable equal to 1 for funds marketed to institutional investors and is otherwise equal to zero. We estimate two separate model series. The regressions include time fixed effects. Standardized coefficient values are reported with t-statistics in parentheses. T-statistics are calculated with White (1980) heteroskedastic consistent standard errors clustered by fund.

Dependent Variable	$\beta_{13,T}$		$\beta_{37,T}$		$\beta_{61,T}$	
	1	2	3	4	5	6
Log Fund TNA $_{T-1}$	0.34	0.37	0.55	0.40	0.28	0.34
	(4.65)	(4.87)	(6.40)	(4.55)	(4.46)	(4.47)
Log Fund Age $_{T-1}$	0.10	0.07	0.12	0.06	0.27	0.16
	(2.05)	(1.52)	(1.91)	(1.49)	(3.80)	(2.43)
Log # Funds in Family $_{T-1}$	0.04	0.09	0.05	0.09	0.05	0.06
	(1.00)	(1.63)	(1.23)	(2.27)	(1.17)	(1.80)
Log Family TNA $_{T-1}$	0.44	0.24	0.24	0.27	0.23	0.26
	(4.92)	(3.46)	(3.88)	(3.68)	(3.56)	(3.17)
Fund Return Std. $_{T-1}$	-0.08	-0.16	-0.25	-0.14	-0.10	-0.12
	(1.41)	(2.55)	(2.81)	(3.20)	(1.77)	(2.49)
Morningstar Rating $_{T-1}$	-0.24	-0.19	-0.21	-0.27	-0.25	-0.21
	(3.69)	(2.41)	(2.82)	(3.47)	(3.35)	(3.18)
Portfolio Turnover $_{T-1}$	-0.06		-0.06		-0.06	
	(1.75)		(1.65)		(1.17)	
Expense Ratio $_{T-1}$	-0.14		-0.09		-0.20	
	(2.19)		(2.15)		(2.72)	
Institutional Fund		-0.15		-0.08		-0.06
		(2.53)		(1.49)		(1.26)
Adjusted R^2	0.22	0.19	0.24	0.22	0.26	0.25

Table VII
Time Series Determinants of Stale Performance Chasing

In this table the dependent variable is the annual frequency time series of coefficients β_n from the regressions: $Flow_{i,t} = \alpha_i + \beta_1 Return_{i,t-1} + \beta_n Return_{i,t-n} + \varepsilon_{i,t,}$ for n = 13, 37, 61, where flow is the percentage growth in mutual fund total net assets TNA, defined as: $TNA_{i,t} - TNA_{i,t-1} \times 1 + Return_{i,t}/TNA_{i,t-1}$ in month t for fund i estimated for each year T. Independent variables are the logarithm of: fund TNA, fund age measured from the date of fund inception to the start of the year of β_n estimation, # of funds offered by the investment company family of the fund and total family TNA. Fund Return Standard Deviation Std is calculated over the prior year based on the fund's monthly returns. Morningstar rating is the number of stars 1 to 5 assigned to the fund in Morningstar's fund rating system. Mutual Fund Ad Spending is the total expenditure on advertising in magazines that mention the fund of interest, partitioned by whether the ad reports holding period returns or not. As proxies for market conditions we use: 1 the Chicago Board Option Exchange Volatility Index VIX and 2 the CFNAI index produced by the Chicago Federal Reserve. The regressions include time fixed effects. Standardized coefficient values are reported with t-statistics in parenthesis. T-statistics are calculated with White (1980) heteroskedastic consistent standard errors clustered by fund.

Dependent Variable	$\beta_{13,T}$			$\beta_{37,T}$			$\beta_{61,T}$		
	1	2	3	4	5	6	7	8	9
Log Fund TNA $_{T-1}$	0.44	0.57	0.51	0.56	0.47	0.29	0.62	0.39	0.45
	(5.18)	(7.76)	(5.26)	(6.59)	(5.87)	(3.33)	(6.34)	(4.11)	(5.09)
Log Fund Age $_{T-1}$	0.01	0.02	0.01	0.38	0.22	0.37	0.23	0.29	0.28
	(1.16)	(1.12)	(1.06)	(4.12)	(3.66)	(4.23)	(2.48)	(4.09)	(3.94)
Log # Funds in Family $_{T-1}$	0.06	0.05	0.05	0.07	0.08	0.07	0.01	0.01	0.01
	(1.58)	(1.23)	(1.54)	(1.46)	(1.82)	(1.88)	(0.89)	(0.74)	(0.85)
Log Family TNA $_{T-1}$	0.27	0.37	0.39	0.15	0.20	0.14	0.17	0.14	0.09
	(3.87)	(4.52)	(4.54)	(2.20)	(3.06)	(2.50)	(3.25)	(1.87)	(1.73)
Fund Return Std. $_{T-1}$	-0.23	-0.24	-0.22	-0.29	-0.23	-0.29	-0.25	-0.27	-0.27
	(2.93)	(3.37)	(3.67)	(3.70)	(2.91)	(3.72)	(2.79)	(3.38)	(3.98)
VIX $_{T-1}$	-0.33	-0.33	-0.38	-0.13	-0.14	-0.11	-0.55	-0.54	-0.61
	(4.14)	(4.01)	(4.26)	(2.15)	2.37)	(2.61)	(6.33)	(6.30)	(7.71)
CFNAI $_{T-1}$	0.24	0.23	0.13	0.42	0.28	0.43	0.32	0.34	0.47
	(2.84)	(3.41)	(1.84)	(5.12)	(4.16)	(5.19)	(5.11)	(5.15)	(5.43)
Morningstar Rating $_{T-1}$	-0.17	-0.21	-0.12	-0.31	-0.24	-0.23	-0.32	-0.28	-0.27
	(2.96)	(2.86)	(2.21)	(4.40)	(3.73)	(3.90)	(4.83)	(3.86)	(3.60)
Mutual Fund Ad Spending HPR $_{T-1}$	-0.11		-0.12	-0.41		-0.42	-0.57		-0.62
	(2.37)		(1.57)	(4.92)		(4.79)	(6.76)		(7.20)
Mutual Fund Ad Spending No HPR $_{T-1}$		-0.06	-0.06		-0.03	-0.05		-0.07	-0.05
		(1.66)	(1.50)		(1.11)	(1.76)		(2.04)	(1.67)
VIX × MF Ad Spending HPR $_{T-1}$	-0.22		-0.22	-0.16		-0.12	-0.11		-0.19
	(2.99)		(3.34)	(2.88)		(1.96)	(2.84)		(3.16)
VIX × MF Ad Spending No HPR $_{T-1}$		-0.06	-0.05		-0.05	-0.05		-0.07	-0.03
		(1.59)	(1.36)		(1.60)	(1.42)		(1.49)	(1.34)
1/CFNAI × MF Ad Spending HPR $_{T-1}$	-0.14		-0.12	-0.09		-0.10	-0.07		-0.06
	(2.61)		(2.38)	(2.05)		(2.38)	(1.83)		(1.65)
1/CFNAI × MF Ad Spending No HPR $_{T-1}$		-0.01	-0.01		-0.01	-0.01		-0.06	-0.01
		(1.25)	(1.13)		(1.26)	(1.22)		(1.41)	(0.77)
Adjusted R^2	0.31	0.27	0.35	0.34	0.29	0.35	0.32	0.29	0.34

Table VIII
Stale Performance Chasing and Mutual Fund Fees

In this table we relate mutual fund expense ratios (*Fee*) and fee waivers to the annual frequency time series of coefficients (β_n) from the regressions: $Flow_{i,t} = \alpha_i + \beta_1 Return_{i,t-1} + \beta_n Return_{i,t-n} + \varepsilon_{i,t,}$ for n = 13, 37, 61, where flow is the percentage growth in mutual fund total net assets (TNA), defined as: $TNA_{i,t} - TNA_{i,t-1} \times (1+Return_{i,t})/TNA_{i,t-1}$ in month t for fund i estimated for each year T. Expense ratio is the percentage of total net assets paid by investors for the fund's operating expenses. Fee is total expenses paid by investors, expressed as a percentage of total net assets (%Fee) and as a dollar value ($Fee). Fee waiver is the reduction in fees as a percentage of net assets applied to the expense ratio reported in the fund prospectus. Objective and excess fund β_n values are considered where *Objective* β_n is calculated by relating fund objective flow to value-weighted mean objective returns and *Excess* β_n is calculated by relating fund flow to fund returns in excess of the value-weighted mean objective return. Control variables are as previously defined, except fund and family alpha which are calculated using the Fama-French 4-factor model. The models include time fixed effects. Standardized coefficient values are reported with t-statistics in parenthesis. T-statistics are calculated with White (1980) heteroskedastic consistent standard errors clustered by fund. Panel A reports logit model estimates, utilizing fee increase or decrease indicators as dependent variables. Panel B reports OLS panel regression estimates utilizing %Fee, Δ$Fee and Δ%Waivers as dependent variables.

Panel A: Logit Model

Dependent Variable	%Fee$_T$ Increase Indicator			%Fee$_T$ Decrease Indicator		
	n=13	n=37	n=61	n=13	n=37	n=61
	(1)	(2)	(3)	(4)	(5)	(6)
Objective $\beta_{n,T-1}$	-0.12	-0.14	-0.14	0.24	0.18	0.22
	(1.89)	(2.76)	(2.42)	(3.65)	(3.07)	(3.20)
Excess $\beta_{n,T-1}$	-0.23	-0.22	-0.18	0.19	0.24	0.30
	(3.46)	(3.19)	(2.77)	(2.75)	(3.58)	(4.05)
Fund Fee $_{T-1}$	-0.17	-0.28	-0.17	0.01	0.01	0.01
	(2.86)	(3.97)	(2.86)	(0.97)	(0.81)	(1.24)
Fund ΔFee $_{T-1}$	0.21	0.07	0.09	-0.15	-0.09	-0.19
	(3.32)	(1.87)	(2.19)	(2.68)	(1.65)	(2.39)
Fund Alpha $_{T-1}$	0.22	0.21	0.17	-0.31	-0.21	-0.16
	(2.94)	(3.40)	(2.76)	(3.97)	(3.40)	(2.15)
Fund Flow $_{T-1}$	0.10	0.17	0.09	-0.19	-0.12	-0.10
	(1.80)	(2.75)	(1.85)	(3.07)	(1.95)	(2.11)
Fund Flow Std. $_{T-1}$	-0.03	-0.22	-0.15	0.04	0.12	0.15
	(1.34)	(3.39)	(2.68)	(1.35)	(2.30)	(2.97)
Fund Age $_{T-1}$	0.01	0.01	0.01	-0.01	-0.01	-0.01
	(1.35)	(1.18)	(0.79)	(0.95)	(1.37)	(0.76)
Log Fund TNA $_{T-1}$	-0.06	-0.09	-0.06	0.04	0.07	0.07
	(1.23)	(2.12)	(1.19)	(1.36)	(1.26)	(1.57)
Family Alpha $_{T-1}$	0.13	0.14	0.12	-0.21	-0.25	-0.12
	(2.81)	(2.11)	(2.39)	(3.24)	(3.75)	(2.34)
Log Family TNA $_{T-1}$	-0.14	-0.13	-0.21	0.10	0.09	0.19
	(2.80)	(2.00)	(2.70)	(1.88)	(1.52)	(3.31)
Log Objective TNA $_{T-1}$	-0.02	-0.01	-0.01	0.05	0.03	0.03
	(1.41)	(1.04)	(1.41)	(1.72)	(0.97)	(1.80)
Morningstar Rating $_{T-1}$	0.26	0.22	0.15	-0.03	-0.06	-0.04
	(3.42)	(3.18)	(2.61)	(1.26)	(1.59)	(1.47)
McFadden R^2	0.32	0.35	0.41	0.30	0.27	0.33

Panel B: OLS Model

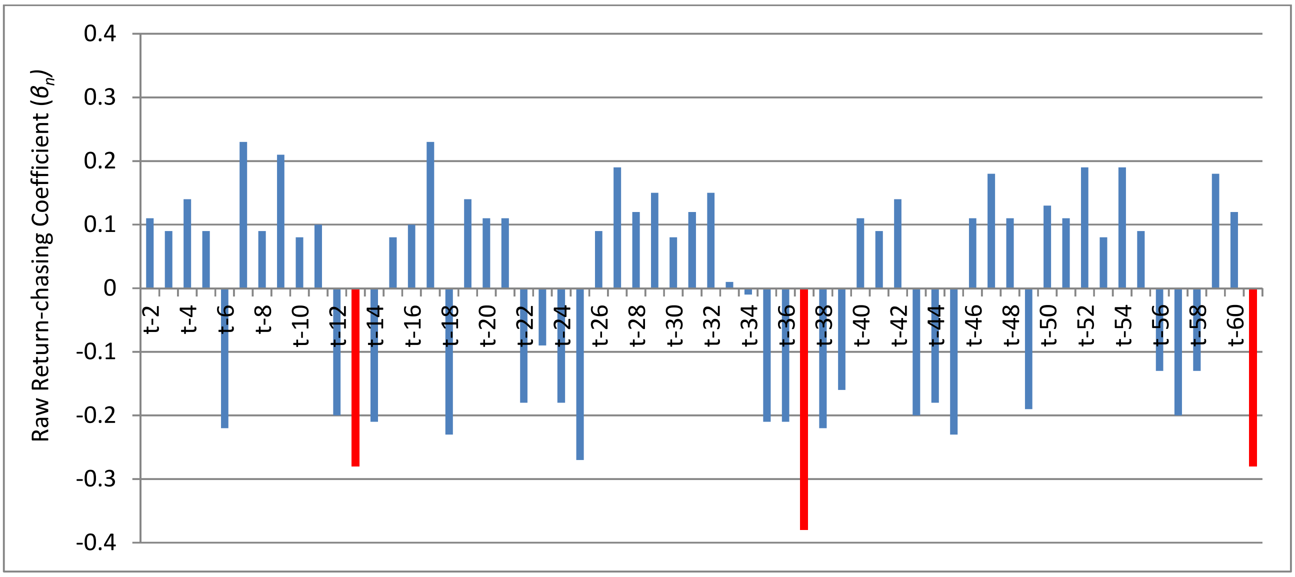
Dependent Variable	$\%Fee_T$			$\Delta\$Fee_T$			$\Delta\%Waiver_T$		
	n=13	n=37	n=61	n=13	n=37	n=61	n=13	n=37	n=61
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Objective $\beta_{n,T-1}$	-0.16	-0.29	-0.25	-0.15	-0.26	-0.25	0.14	0.22	0.20
	(2.71)	(3.77)	(3.27)	(1.82)	(2.48)	(2.92)	(2.30)	(2.90)	(2.81)
Excess $\beta_{n,T-1}$	-0.15	-0.24	-0.25	-0.13	-0.26	-0.27	0.17	0.19	0.24
	(2.51)	(3.67)	(3.45)	(2.01)	(4.05)	(4.08)	(2.91)	(2.76)	(2.55)
Fund Fee $_{T-1}$	0.11	0.12	0.06	0.12	0.11	0.06	-0.13	-0.14	-0.07
	(2.38)	(2.33)	(1.33)	(2.77)	(1.86)	(1.56)	(3.06)	(3.10)	(1.58)
Fund Alpha $_{T-1}$	0.24	0.12	0.20	0.24	0.11	0.23	-0.28	-0.15	-0.16
	(3.10)	(2.11)	(3.03)	(2.60)	(1.86)	(4.00)	(3.69)	(2.70)	(2.05)
Fund Flow $_{T-1}$	0.15	0.16	0.09	0.15	0.16	0.08	-0.11	-0.13	-0.08
	(2.85)	(2.36)	(2.11)	(1.90)	(1.71)	(1.77)	(2.39)	(1.92)	(1.62)
Fund Flow Std. $_{T-1}$	-0.09	-0.15	-0.12	-0.10	-0.13	-0.12	-0.09	-0.14	-0.14
	(1.85)	(3.00)	(1.96)	(2.25)	(2.44)	(1.74)	(2.16)	(2.46)	(2.46)
Fund Age $_{T-1}$	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.02
	(1.15)	(1.36)	(1.33)	(0.79)	(1.64)	(1.57)	(1.44)	(1.62)	(1.59)
Log Fund TNA $_{T-1}$	-0.10	-0.09	-0.05	-0.11	-0.10	-0.05	0.09	0.08	0.04
	(2.23)	(1.73)	(1.40)	(2.61)	(2.12)	(0.94)	(1.88)	(1.50)	(1.11)
Family Alpha $_{T-1}$	0.19	0.18	0.30	0.20	0.19	0.34	-0.19	-0.20	-0.24
	(2.73)	(3.13)	(4.06)	(3.18)	(3.95)	(4.91)	(1.82)	(3.52)	(3.43)
Log Family TNA $_{T-1}$	-0.14	-0.07	-0.12	-0.13	-0.08	-0.12	0.14	0.07	0.13
	(2.58)	(1.53)	(1.85)	(1.88)	(1.73)	(1.44)	(2.01)	(1.36)	(2.09)
Log Objective TNA $_{T-1}$	-0.05	-0.02	-0.01	-0.04	-0.02	-0.01	-0.05	-0.02	-0.01
	(1.61)	(1.27)	(1.24)	(1.21)	(1.09)	(0.82)	(1.38)	(1.63)	(0.94)
Morningstar Rating $_{T-1}$	0.11	0.13	0.18	0.12	0.13	0.20	-0.09	-0.12	-0.22
	(2.38)	(2.27)	(2.92)	(2.65)	(2.00)	(3.68)	(1.76)	(1.95)	(3.55)
Adjusted R^2	0.28	0.26	0.32	0.27	0.26	0.31	0.25	0.24	0.29

Figure 1

Return-chasing Coefficient Comparison

This figure displays the return-chasing coefficient (β_n) from the series of 60 separate regressions: $Flow_t = \alpha + \beta_1 Return_{t-1} + \beta_n\ Return_{t-n} + \varepsilon_{t,}$ for all values of n from 2 to 61, where flow is the percentage growth in mutual fund total net assets (TNA), defined as: $TNA_{i,t} - TNA_{i,t-1} \times (1+Return_{i,t})/TNA_{i,t-1}$ in month t for fund i. Bars for return coefficients coinciding with commonly reported holding period return periods are highlighted in red. The sample includes all domestic, actively managed mutual funds in the U.S. between 1992 and 2010. We estimate two separate model series, in Panel A the β_n coefficient is estimated using raw fund returns as the independent variable and Panel B does the same using fund returns in excess of the value-weighted mean fund objective return as the independent variable.

Panel A: Raw Returns



Panel B: Excess Returns

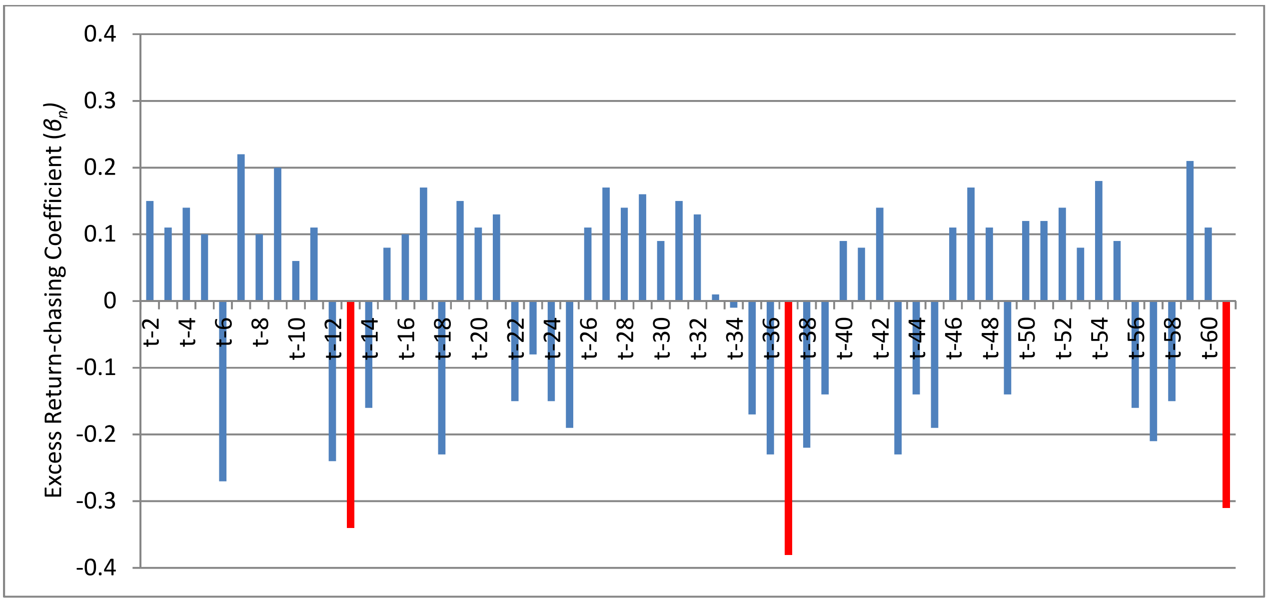


Figure 2
Sample Advertisements

This figure depicts sample advertisements that feature HPRs (Panel A) and do not (Panel B).

Panel A: Featuring HPRs

Panel B: Excluding HPRs