What performance measures do investors chase?

Evidence from Real Estate Mutual Funds

Ryan G. Chacon*
Assistant Professor of Finance
University of Colorado,
Colorado Springs
Colorado Springs, CO, 80919
(619) 781-7948
Rchacon2@uccs.edu

Pratik Kothari
Assistant Professor of Finance
Oakland University
318 Meadow Brook Rd.
Rochester, MI, 48309
(817) 374-2820
pkothari@oakland.edu

Thibaut G. Morillon
Assistant Professor of Finance
Love School of Business
Elon University
Elon, NC 27244
(336) 278-6605
Tmorillon@elon.edu

Abstract: We investigate how real estate mutual fund (REMF) investors evaluate performance when choosing where to allocate capital. Using an exhaustive list of performance metrics ranging from the simplest to the most complex, we find that investment performance evaluations differ depending on the type of investor. Using a measure to approximate retail and institutional oriented funds, we find that fund flows into retail-oriented funds are driven mostly by simple unadjusted returns. Fund flows into institutional oriented funds are best explained by CAPM alphas using a REIT index as the market index. Additionally, although REIT-based multi-factor models appear to explain REMF performance the best empirically, they are the least likely to be used to benchmark performance by both retail and institutional investors. These findings shed light on the ongoing debate of the level of sophistication of mutual fund investors.

Keywords: Real Estate Mutual Fund (REMF), Fund Flows, Retail Investors, Performance Chasing, REITs, Fund Performance, Alpha

Introduction

Perhaps the most popular phrase used to describe the goal of an active fund manager is to "beat the market." In classic academic fashion, the literature tends to qualm over what the *market* actually refers to and what it looks like to consistently *beat* it. While the academy has long held that performance should be considered relative to the risk taken, many investment managers (particularly retail facing ones) still use benchmark-adjusted returns or unadjusted returns to define success or failure.

For example, one of the largest active management fund providers is Fidelity. On their website in a section entitled "beat the benchmark", Fidelity touts statistics regarding the "outperformance" of their tenured portfolio management.[1] The measure for outperformance is simply whether returns are in excess of the funds' stated benchmark. There is no mention of risk, beta, or alpha. Interestingly, other large investment firms are more risk-aware in their marketing. Consider the following quote from the active equities section of Blackrock's website: "We harness the power of human intellect, industry-leading technology and the global scale of BlackRock in our mission to deliver consistent, risk-managed alpha."[2] This contrast between the two begs the question: Do active fund investors chase risk-managed alpha or simply high returns?

In recent years, this distinction between how mutual fund managers *should* be evaluated and how fund managers *actually are* evaluated has led researchers to investigate how investors select mutual funds. Open end mutual funds are a natural place to examine how investors benchmark performance because fund flows are easily observable and time varying. A mature literature documents that mutual fund investors chase past performance (Chevalier and Ellison, 1997; Chou

[1] https://www.fidelity.com/mutual-funds/investing-ideas/beat-the-benchmark
[2] https://www.blackrock.com/us/individual/education/equities/active-equities/fundamental-equities

and Hardin, 2014; Ling and Naranjo, 2006; Sialm, Starks, and Zhang, 2015, among others), but what performance metrics do they chase? Two key findings in recent years include Barber, Huang, and Odean (2016) and Berk and van Binsbergen (2016). Both papers suggest that investors chase CAPM alphas, indicating that investors discount market risk when evaluating fund manager performance. Other papers have since followed that build on the idea that mutual fund investors are complex rational actors (Li, Tiwari, and Tong 2017; Back, Crane, and Crotty 2018; Artavanis, Eksi, and Kadlec 2019) and allocate funds to alpha generating managers.

In contrast, building on a literature that documents simplistic retail investor behavior, Ben-David et al. (2022) show that investors simply chase Morningstar ratings. While Morningstar ratings are based on a somewhat risk-adjusted methodology, they go to great lengths to show that investors simply follow the star rating and don't display understanding of the underlying method. Moreover, the authors provide simulation evidence that the findings of both Barber, Huang, and Odean (2016) and Berk and van Binsbergen (2016) are spurious. This dispute in the diversified mutual fund literature regarding the level of investor sophistication is ongoing.

In our paper, we focus on what performance metrics investors chase for a subset of specialized funds that invest in real estate securities known as Real Estate Mutual Funds (REMFs). The diversified mutual fund literature has imperfect but established benchmark models such as the Capital Asset Pricing Model (CAPM), Fama French 3-Factor model (FF3), and Fama French Carhart Model (FFC4) among others for which to define alpha (Fama and French, 1993; Carhart 1997). However, Real estate mutual funds (REMFs) are particularly interesting to examine because how to adequately benchmark their performance is unclear. REMFs predominantly invest

in public listed Real Estate Investment Trusts (REITs).[3] The literature to date examining REMF performance uses a wide array of benchmark models that range from using the traditional factor models for diversified funds, recreating those factor models using REITs only, or adding a real estate specific factor to the traditional models.[4] Importantly, these differing benchmark choices lead to different conclusions regarding whether REMF managers can consistently *beat the market*.

To illustrate the various models used in previous REMF studies, we present a summary in Table 1. This table provides information on the study, data source, sample period, primary finding related to performance, and the benchmark model used.[5]

[Insert Table 1 Here]

What is apparent is the wide use of different models often mixing and matching REIT based factors and traditional factors. Perhaps unsurprisingly, the differing benchmark models often led to different findings related to average performance. An early seminal paper in the REMF literature, Kallberg, Liu, and Trzcinka (2000) found that contrary to diversified funds, REMFs outperform on average. The authors used a custom multifactor model that included traditional size and value factors, a bond factor, and a market factor that used a REIT index. Other papers documented no outperformance and used FFC models but used REIT based factors to construct them (Chou and Hardin 2014; Lantushenko and Nelling 2019; Hartzell, Mulhlhofer and Titman 2010). Still others used various combinations of REIT based and traditional factors. For example, Derwall et al.

[3] Approximately 90% of REMFs equity holdings are public listed REITs. (Ro and Gallimore, 2014; Chacon, Morillon, Kothari 2022)

[4] A similar wide range of benchmark models are used to price REITs themselves. Early papers include Ling and Naranjo (1997;1999), Peterson and Hsieh (1997) but papers using factor models for REITs are numerous.

[5] Several papers use more than one benchmark model in their study. For example, Lantushenko and Nelling (2019) use both traditional and REIT based factors and both CAPM and Fama French Carhart models. Hartzell, Mulhlhofer, and Titman (2010) test a plethora of different benchmark models. We list the model with the most factors in the table.

(2009) used a traditional FF3 model but added a momentum factor constructed only from REIT returns.

Rather than focus on which benchmark model is most appropriate or best fits the data, our paper is novel to the REMF literature because we instead ask which benchmark model investors care about. Put differently, rather than focus on what benchmark model investors *should* use, we investigate what models they *actually* use. Following the mainstream finance literature, we examine this question by observing how various performance measures attract fund flows.

Using a sample of REMFs from 1995-2019, we compute a large number of performance metrics to test how investors respond to them. Specifically, we include both simple measures such as unadjusted returns and Morningstar ratings as well as complex measures such as 1, 3, and 4 factor models using both traditional factors and factors constructed using REIT returns. We perform a wide variety of tests to examine different angles of the simple research question: what performance metrics do investor chase?

Our baseline set of results suggests investors chase a mix of unadjusted returns, Morningstar ratings, or CAPM-based alphas. This result is not particularly fruitful in answering our research question other than ruling out the chasing of more complex alphas such as FF3 or FFC-based alphas. However, a natural next question to investigate is whether there exist measurable differences in investor sophistication attached to fund flows. To address this, we next create a measure based on whether the fund is predominantly retail facing or institutional facing. Our *a priori* expectation is that institutional investors would be more risk-aware than retail ones.

After splitting the sample between retail and institutional oriented funds, our results are significantly more illuminating. We provide evidence that unadjusted returns are the primary

driver of fund flows for retail-oriented funds and CAPM alphas using a REIT index as the market factor is the primary driver of fund flows for institutional oriented funds. This result provides nuance to a divided mainstream finance literature and suggests that some investors display some degree of sophistication and others do not.

Importantly, we do not conclude that all retail investors follow unadjusted returns and all institutional investors follow CAPM REIT alphas. A more appropriate description of the results would be a ranking system of which performance metrics are most valuable to a typical fund investor. In this framework, because the literature is divided on the topic, we are interested in how each investor group approaches traditional factor models compared to the same factor models constructed using the universe of REITs. Though less empirically conclusive, our results suggest retail investors do not distinguish between traditional factor models and REIT-based factor models while institutional investors prefer REIT-based factor models. Given many studies conclude that REIT based factors better describe REMF returns (Hartzell, Mulhlhofer, and Titman 2010), this is further evidence of the lack of sophistication of REMF retail investors.

Our findings have significant implications for research and practice in the REMF space. We are the first to our knowledge to directly examine the level of sophistication of REMF investors. We provide evidence that retail REMF investors are quite simplistic, following unadjusted returns more so than any other performance metric. Institutional oriented funds, which make up 37% of the funds, seem to be more risk aware and focused on the managers ability to generate alpha in excess of the REIT-based CAPM benchmark. These findings provide nuance to previous work in the REMF space that relies on rational mutual fund investors to explain mutual fund performance (e.g. Chou and Hardin, 2014).

In practice, fund managers are compensated based on assets under management (AUM). Greater fund flows lead to increased AUM and therefore higher compensation. We are the first to our knowledge to show that retail-oriented REMF managers incentivized to grow AUM should focus primarily on maximizing simple unadjusted returns. Such an incentive is suboptimal for the investor as the fund manager may take on outsized risk without penalty. A potential policy implication is to invest in increasing financial literacy for mutual fund investors to be more risk-aware. Institution-oriented fund managers, in contrast, are incentivized to focus on REIT-based CAPM alphas. This is seemingly more in line with an optimal relationship between informed parties.

The remainder of this paper is organized as follows. Section two describes the data. Section three details the empirical methods and results. Section four concludes.

Data

Our sample consists of REMF fund-months from January 1995 to December 2019. The monthly fund return data from the CRSP (Center for Research in Security Prices) Survivor-Bias-Free US Mutual Fund Database. Our sample begins in 1995 to be consistent with other recent studies on REMFs including Lantushenko and Nelling (2019), Hartzell et al. (2010), Chou and Hardin (2014), and Cici et al. (2011).

We are careful to ensure our sample solely consists of real estate mutual funds through the following screening method. We keep funds with Lipper objective code "RE", Lipper class code "RE", Strategic Insight code "RLE" or CRSP objective code "ESDR". Funds where none of the Lipper or Strategic Insight codes were available are excluded from the analysis. We also search for fund names that contained "real estate", "REIT", or "Realty." Our focus is on domestic REMFs,

so we excluded funds that contained "international", "emerging market", "global", "euro", "currency", or "world" in their fund name. We are focused on open-ended actively managed funds. Therefore, we also screened out funds flagged as index funds or ETFs using the "index_fund_flag" and "et_flag" variables in CRSP. We drop funds that appeared to be real estate fixed income funds. We reviewed the final list of funds manually to screen out any leftover funds that are not REMFs. This yielded us a total of 96 unique funds and 13,418 fund-months.

We then merged this set of funds with Morningstar direct to obtain Morningstar ratings. We identified Morningstar ratings for 78 of the 96 funds and 9,004 fund-month observations. Given a meaningful number of funds would be dropped if we excluded funds without Morningstar ratings, we conduct all tests in this paper on the sample with Morningstar ratings (Morningstar sample) and the sample of all funds (full sample).

Our variables of interest for this study are each performance metric, fund flows, and whether the fund is retail or institution oriented. We define fund flows following the standard convention in the literature:

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

Where TNA is the total net assets, *i* is the fund and *t* is the month, and *R* is the fund return in month *t*. Morningstar ratings are the ratings, 1 to 5, in a given fund-month. For each return and alpha variable, we calculate them at both the net and gross basis. Gross returns are net returns plus the expense ratio divided by 12. For each benchmark model, we estimate alpha using 24 month rolling betas.

We refer to factor models using factors based on all stocks from Kenneth French's website as *traditional* factor models. We also compute what we refer to as *REIT-based* factor models. These models use the same definition and break points as Kenneth French's website, but they are created manually within the REIT universe. Specifically, the REIT-based market factor is constructed using the NAREIT index. The size portfolio is constructed by splitting all REITs into two groups based on median market capitalization in June of each year. The size return is equal to the small portfolio return minus the large portfolio return. The book-to-market portfolio is formed by dividing REITs into three groups based on their book-to-market ratios as of December each year. The low book-to-market portfolio is the bottom 30% and the high book-to-market is the top 30%. The difference between the high and low book-to-market portfolios is the portfolio return. Lastly, the momentum factor is constructed by sorting all REITs based on their month t-2 to t-12 cumulative returns. Winners (top 30% momentum REITs) minus losers (bottom 30% momentum REITs) is how the factor is created. For traditional factor models, we refer to the CAPM, Fama French 3-factor model, and Fama French Carhart 4-factor model as CAPM, FF3, and FFC4, respectively. For each REIT-based version, we add "REIT" to the same abbreviations.

Next, we construct a measure to capture whether a fund is retail or institution oriented. Following the mutual fund literature, if a fund has multiple classes (e.g. A, B, and C), we aggregate them for our study. However, CRSP provides an identifier at the class level that identifies whether the fund is a retail fund or an institutional fund. We use these indicators weighted by total net assets (TNA) as the class level to calculate a percentage of retail orientation at the fund level. To illustrate, if a fund has Class A – Retail Class with $100 million of TNA and a Class B – Institutional Class with $20m of TNA, our retail-oriented measure is equal to 83.33% (100/(100+20)). We define any fund greater than 50% as a retail-oriented fund

and other funds are institutional oriented. We lose 868 fund-month observations out of 14,589 (5.9%) for missing data. After this, we have 8,684 retail-oriented funds and 5,037 institution-oriented funds. For the remainder of the paper, we will refer to the retail-oriented funds as retail funds and institution-oriented funds as institutional funds. We have 4 different sub-samples used throughout the study: First we have a sample of funds that have Morningstar ratings and a full sample that includes all funds. Then, within the Morningstar and full sample, we examine retail funds, institutional funds, and both combined.

Table 2 presents summary statistics for each variable used throughout the study. Panel A displays statistics for the sample. The typical Morningstar rating is slightly above 2.5 and the median is 3.0. One item of note is the average fund flows are negative over the sample period. This reflects the overall decline in REMF popularity, particularly in recent years. Given REITs continue to grow at a steady pace, it potentially reflects an overall trend to passively managed funds rather than active ones. As expected, net returns are lower than gross returns by approximately 10 bps per month. Panel B and C present summary statistics for the retail and institution funds, respectively. Interestingly, there is quite little difference between the average performance of the funds in each group. Institutional funds appear to have more significant overall outflows during the sample period compared to retail ones.

[Insert Table 2 Here]

In, Table 3, we present the correlations between alphas of various performance measures. Returns and alphas are the average of the past 12 months. This is particularly of interest because if the performance metrics are sufficiently highly correlated, differentiating between metrics is not a fruitful question. Interestingly, given many models use overlapping factors, we observe significant

variation across metrics. For example, the correlation between returns and Morningstar ratings is merely 0.07. The only correlation greater than 0.5 for net returns is the traditional CAPM at 0.60.

[Insert Table 3 Here]

It is equally interesting to note the correlations between traditional factor models and their REIT based counterparts. Again, if they are highly correlated, the effort to calculate factor models within REITs is futile. However, this is far from the case. The correlation between traditional CAPM and CAPM REIT is 0.39. The correlations between FF3 and FF3 REIT and FFC4 and FFC4 REIT are 0.37 and 0.23, respectively. These relatively low correlations suggest there is a significant difference between factor models using all stocks and factor models constructed within the REIT universe. Now that we have established that performance metrics vary, we next investigate REMF performance by performance metric and which performance metrics investors chase.

Empirical Methods and Results

We begin the empirical analysis by observing the average net and gross alphas using each benchmark model for REMFs over the sample period. This serves as an overview of REMF performance and the funds' sensitivity to benchmark choice and fees (gross vs. net). For each of the alphas, we annualize them by multiplying the monthly average by 12. Figure 1 presents the results with panel A displaying gross alphas and panel B displayed net alphas. Unsurprisingly, whether REMFs beat the market on average depends heavily on benchmark model.

[Insert Figure 1 Here]

There is significant variation in average alphas across benchmark models. The most popular risk-adjusted model by far is the CAPM. This is evidenced by the widespread reporting of CAPM betas across investment websites and corporate finance websites. Arguably the next most wide-spread

model is the Fama French 3-factor model. This is evidenced by the common use of size and value vs. growth categories to describe funds by Morningstar and the funds themselves.[6] Using these two models with traditional factors, REMFs display impressive average performance. REMFs generate an average of 3.34% and 3.10% in gross alpha per year using the traditional CAPM and FF3, respectively. To put this in economic perspective, a typical fund annual expense ratio is approximately 1%. To justify paying 1% to invest with an active manager, the manager must beat the market by at least 1%. Based on these benchmark models, REMFs are more than tripling this hurdle. Average alphas using returns net of fees confirms this analysis with 2.17% and 1.93% for CAPM and FF3, respectively. Interestingly, after accounting for the traditional momentum factor, REMF outperformance cuts by more than half. In fact, on a net alpha basis, the average FFC alpha is a mere 8 basis points per year. This result is consistent with the literature that documents both REMFs and REITs are impacted heavily by momentum (Derwall et al., 2009; Chui, Titman, and Wei 2003a).

As Roll (1978) notes, the choice of benchmark is incredibly important. If selected incorrectly, a passive index with no skill could be attributed alpha.[7] This is particularly notable for REMFs because the vast majority of their holding are REITs and therefore the portfolio is quite different from the typical proxy for the market portfolio. A regression of a REIT index on the market factor defined by Fama and French (1993) could result in a positive or negative alpha even though the index was passive.

[6] For example, in grouping funds, Fidelity classifies them as “Large Growth”, “Large Value”, “Small-Mid Growth”, and “Small/Mid Value”. (Source: https://www.fidelity.com/mutual-funds/fidelity-funds/overview)

[7] In the REMF space, Hartzell, Mulhlhofer, Titman (2010) demonstrate that this is the case in the context of whether to use simply a REIT market factor or to use value and size factors constructed by REITs as well. They found that many REMFs tilted their portfolios towards small cap and value REITs, leading to alpha using the CAPM with REIT factors as the benchmark.

A cursory view of Figure 1 shows the impact of using REITs to construct CAPM, FF3, and FFC4 factors on average alphas. The alphas are notably smaller at the gross level and become negative for net alphas. Specifically, the average gross alphas using REIT based factors is 1.00%, 1.12%, and 0.53% for CAPM, FF3, and FFC4, respectively. The average net alphas using REIT based factors is -0.18%, -0.05%, -0.65% for CAPM, FF3, and FFC4, respectively. These findings are critically important for understanding whether active managers add value in the REMF space. Crossing the threshold from positive to negative average net alphas is an important cutoff because negative values imply the investor is better off holding the passive index than paying an active manager. Similar to traditional factor models, adding the momentum factor (FFC4) erodes an economically sizable amount of alpha whereas the CAPM and FF3 are similar to one another. Panels C and D examine net alphas broken out by retail and institutional funds. Consistent with the summary statistics, average performance is remarkably similar across groups. For both groups, we observe outperformance using traditional factor models and under-performance using REIT based factor models.

These results provide important evidence of how investors *should* benchmark returns. If investors use traditional factor models to explain REMF returns rather than REIT-based factors, they will conclude that REMFs outperform significantly more than they do if REIT-based factors are used. Given REMFs investable universe is largely confined to REITs, it seems REIT-based factors would be more appropriate.

It is worth noting that manager outperformance should be measured at the gross alpha level. If gross alphas are positive and net alphas are zero, it simply suggests that managers capture their outperformance with fees. Regardless of benchmark model, gross alphas are all positive on average. This is consistent with the findings of Chou and Hardin (2014) and Chacon, Morillon,

and Kothari (2022). This result suggests that REMFs are in fact able to outperform on a risk-adjusted basis. However, depending on the benchmark model used, that outperformance may or may not be passed down to investors after fees.

We next examine how investors benchmark returns in practice. The remainder of the paper will focus on this question and use a battery of empirical methods to investigate it. Following the mainstream finance literature, how funds flow following various measures performance can indicate what investors value (Ben-David et al. 2022; Berk and van Binsbergen 2016; Barber, Odean and Huang 2016, among others). The underlying assumption is that funds evaluated positively will attract more capital than funds evaluated negatively. Various empirical designs have been proposed to evaluate the flow-performance relation for mutual funds using various benchmarks. However, recent findings from Ben-David et al. (2022) cast doubt on several of these methods as they show that simulated data designed to chase simple returns lead to spurious findings. In light of these findings, we rely on the work of Ben-David et al. (2022) for our empirical designs.

We begin by ranking funds monthly by each performance metric. The performance metrics examined include each of the traditional and REIT-based factor models alongside unadjusted returns and Morningstar ratings. It should be noted that because these are ranked within month, ranking by unadjusted returns and ranking by market adjusted returns would lead to the identical set of fund rankings. Given returns and alphas are volatile month to month and investors tend to note performance over a longer period of time, we take the average return and average alpha over the past 12 months. Funds on standard websites such as Fidelity of Blackrock typically present historical performance in 1 year, 3 year, 5 year, and 10 year horizons. We take the ranked funds

by each performance metric and sort them into quartiles. Top rated funds are those in the top quartile of performance and bottom rated funds are those in the bottom quartile of funds.

Figures 2 and 3 present the results of average fund flows to top rated funds by performance measure. Figure 2 presents results of only REMFs that are rated by Morningstar and Figure 3 presents results of all REMFs in our sample. Panel A of each figure is top funds ranked by net alphas. Panels B and C of each figure break out the analysis by retail and institutional funds. In the Morningstar sample (Panel A of Figure 2), we observe that top funds measured by unadjusted returns and Morningstar ratings attract the greatest fund flows. To a lesser extent, CAPM and CAPM REIT appear to attract flows. Finally, the most complex models do not appear to attract flows. Moving to Panels B and C of Figure 2, we see how retail and institutional funds differ. Panel B looks somewhat similar to Panel A, however, the CAPM and CAPM REIT outperforming funds now attract negative fund flows. Unadjusted returns continue to be the most attractive to retail investors. Institutional fund flows (Panel C), however, look starkly different. Funds outperforming based on CAPM REIT alphas attract significantly more flows than any other measure. While funds outperforming measured by unadjusted returns and Morningstar still have positive fund flows, it is four times less than the flows attracted by funds that outperformed measured by CAPM REIT alphas.

[Insert Figure 2 Here]

Figure 3 presents the identical analysis using the full sample of REMFs, including those without Morningstar ratings. The results are relatively similar. For the sample including both retail and institutional funds (Panel A), outperforming funds benchmarked using returns and CAPM-based models attract the most capital. Breaking out retail and institution funds, we identify a similar

pattern that unadjusted returns are most important to retail fund investors and CAPM REIT is most important for institutional fund investors.[8]

[Insert Figure 3 Here]

Thus far, we have only examined flows to top ranked funds by performance metric. However, it is equally reasonable to assume that investors would sell following subpar performance. Next, we look at top and bottom ranked funds and the difference between the two. Table 4 presents the results for both the Morningstar sample and the full sample. Similar to previous tests, Panel A presents retail and institutional funds combined, Panel B examines retail funds, and Panel C examines institution funds. For each sample, we sort the results by the difference in fund flows to top and bottom ranked funds. For Panels A, B, and C, we examine both the full sample of funds and the subset of funds with Morningstar ratings.

For the combined sample in Panel A, we observe that unadjusted returns are the dominant driver of both fund inflows to the top performing funds and fund outflows to the bottom performing funds. However, Morningstar and CAPM-based models are also among the most important performance metrics. As is the theme throughout the paper, more complex factor models appear to have the least importance to both retail and institutional investors.

Turning to retail and institutional funds (Panels B and C, respectively), we again observe that unadjusted returns are the dominant driver of fund flows for retail-oriented funds and CAPM-REIT alphas are the dominant driver of fund flows for institution-oriented funds. The difference in fund

[8] Note that average fund flows over the sample for all funds are negative. This negative fund flow is greater for institution-oriented funds than retail-oriented funds. This is why we observe negative fund flows for all performance measures in Panel C of Figure 3. We are concerned with the relative fund flows compared to the other measures. In Panel C of Table 4, we observe that while top performing funds have negative fund flows, they have significantly less negative fund flows than low performing funds using any benchmark model.

flows for top performing and bottom performing funds is economically meaningful. In a given month, the difference in returns from top and bottom ranked funds by unadjusted returns for retail funds (Panel B, Full sample) is 1.85%. For the institutional funds, difference in fund flows is 1.85% for funds sorted on CAPM REIT alphas.Thus far our results suggest that retail investors generally chase unadjusted returns and institutional investors chase CAPM-REIT alphas. We find no evidence that more complex factor models are utilized significantly by either investor group.

[Insert Table 4 Here]

Next, we compare various performance measures more directly to one another. We follow Ben-David et al. (2022) to conduct a series of horse race tests. Taking two performance metrics at a time, we estimate panel regressions of fund flows on indicators of whether the a fund is ranked as a top performing fund by each metric. We control for calendar month fixed effects and cluster standard errors by fund and month. Our focus is on the difference between the two estimated betas. Therefore, we report the difference in the beta coefficients and a t-statistics of whether that difference is significantly different from zero. The results are displayed in Table 5. Similar to previous results, we have the combined retail and institutional samples in Panel A and retail only in Panel B and institution only in Panel C. For regressions that include Morningstar, we use the Morningstar sample. For those without Morningstar, we use the full sample of funds.

[Insert Table 5 Here]

We sort the results based on relations of interest and several are presented more than once for ease of interpretation. Specifically, we present the regression results of unadjusted net returns,

Morningstar, CAPM, and CAPM REIT each compared to all other models. T-Stat that are bold indicate statistical significance beyond the 10% threshold.

Beginning with unadjusted returns for the combined sample in Panel A, we first note that no measure is overwhelmingly dominant compared to the other benchmarks. The benchmark model with the most statistical significance is unadjusted returns. Fund flows are significantly more sensitive to unadjusted returns than the FF3 and FFC models using both regular factors and REIT-based factor construction. As we have consistently documented, these complex models appear least utilized by investors of all types. Morningstar funds do have higher betas than any other benchmark model, but none of the differences are statistically significant, so we are careful in our interpretation.

Moving to retail funds in Panel B, we observe a more consistent trend. The difference in betas between net returns and every other model are positive and all but Morningstar are statistically significant. Importantly, the difference between net returns and CAPM REIT (the most dominant measure in the institutional sample) has a t-statistic of 2.48. The next benchmark with the most significance is the traditional CAPM. Similar to Panel A, the comparison of any of the simpler models to more complex factor models consistently demonstrate simpler models are used.

Finally, we examine the institutional sample in Panel C. In contrast to the retail sample, and consistent with our previous results, CAPM REIT is consistently the most dominant model. Critically, comparing CAPM REIT to net returns, we observe the difference in betas is statistically significant well beyond the 1% level. Table 5 further confirms our hypothesis that retail investors chase simple returns and institutional investors chase CAPM REIT.

Thus far each of our tests have centered around how top performing active REMFs attract capital relative to other active REMFs. However, the total capital allocated to real estate active fund industry as a whole varies. In our final set of analysis, we examine how average performance of active REMFs attracts capital in a given point in time. We begin by aggregating our fund-month observations into month observations by equal-weight averaging overall performance using each metric. We then sort monthly performance into quartiles and examine fund flows using two measures: *positive flow* is the percentage of funds in a given month with positive fund flows and *fund flows percent* is simply the aggregated percentage of fund flows. If a performance metric is being followed by investors, we would expect to see more fund inflows to the active REMF industry when performance by that metric is strong. The results of these tests are presented in Figure 4.

For brevity, we present the results of the retail (Panel A) and institutional (Panel B) samples only. First, unadjusted returns has a consistent and positive upward trend for *fund flows percent* across quartiles. No other measure except for traditional CAPM has this trend. Interestingly, the traditional CAPM does have a strong upward trend suggesting there may be some retail use of this measure. However, taking all tests as a whole it is clearly less prominent than simple returns. Finally, comparing to the metric most often used by institutional investors, the REIT CAPM, the trend is actually flipped. For REIT CAPM in the retail sample, fund flows are highest when REIT CAPM alphas are lowest. This is further evidence of the stark difference between retail and institutional investor behaviors.

Panel B presents results for the institutional sample. The two charts of note are unadjusted returns and CAPM REIT. Unlike the retail sample, the unadjusted returns charge has no discernable pattern. The greatest flows occur in the second quartile of performance and the lowest flows occur

in the third quartile. Turning to the REIT CAPM, it is the only chart that is a clear upward trend. Both *fund flows percent* and *positive flow* are monotonically increasing across quartiles.

To conclude our analysis on aggregate fund flows, we run time series regressions where the dependent variable is monthly aggregate flows to active REMFs in percent. The independent variables are the various performance metrics. To facilitate comparison, we standardize the independent variables to have a mean of 0 and standard deviation of 1. Similar to the horse races in Table 5, we compare two at a time. The specifications include calendar-month fixed effects and the T-statistics are based on Newey-West standard errors with six lags. For brevity, we examine the retail (Table 6, Panel A) and institutional samples (Table 6, Panel B) separately and focus on returns compared to the rest for retail and REIT CAPM compared to the rest for institutional.

[Insert Table 6 Here]

For the retail sample, net returns have a positive and statistically significant relation to fund flows when included alone (column 1) and included with every other performance metric except the CAPM where neither loads significantly. Importantly, when returns and REIT CAPM are included together in the retail sample, returns continue to load and REIT CAPM is indistinguishable from zero. In the institutional sample, CAPM REIT loads significantly in isolation and when combined with any other metric. Net returns are indistinguishable from zero (column 3). These time series results, taken together, provide further confirmatory evidence that retail investors chase returns and institutional investors chase CAPM REIT alphas.

Conclusion

Are REMF investors rational sophisticated actors that carefully benchmark managers to identify skill? We find nuanced evidence that sophisticated investors typically do and retail investors

typically do not. We present robust evidence that investors' marginal dollar allocated to retail-oriented funds chases funds that have the highest unadjusted returns in the last 12 months. The marginal dollar allocated to institutionally-oriented funds chases alpha using a REIT-based CAPM model. Mutual fund investor sophistication is an important question to address due to the conflict in the literature of how to explain mutual fund performance. Given funds do not tend to outperform on average net of fees, models with rational investors have been developed to explain why they still exist (Berk and Green; Pastor and Stambaugh, 2012; and others).

We provide nuance to the debate surrounding mutual fund investor sophistication. Our findings on institutional funds seem to be supportive of these rational model predictions. However, evidence of lack of investor sophistication in retail-oriented funds points to a simpler answer to the question. Perhaps retail funds continue to attract capital because investors capital is not discerning of skill.

This finding points towards the value of increasing the financial literacy of retail mutual fund investors. If more mutual fund investors could appropriately benchmark fund managers, capital could flow more efficiently to the fund that is ultimately best for the investor. We are the first to our knowledge to compare benchmark models from the perspective of the investor for REMFs. More work understanding the psychology of REMF investors and other factors that drive fund flows would be fruitful.

References

Artavanis, N. T., Eksi, A., & Kadlec, G. B. (2019). Downside risk and mutual fund flows. *Available at SSRN 3302876*.

Back, K., Crane, A. D., & Crotty, K. (2018). Skewness consequences of seeking alpha. *The Review of Financial Studies*, *31*(12), 4720-4761.

Barber, B. M., Huang, X., & Odean, T. (2016). Which factors matter to investors? Evidence from mutual fund flows. *The Review of Financial Studies*, *29*(10), 2600-2642.

Ben-David, I., Li, J., Rossi, A., & Song, Y. (2022). What do mutual fund investors really care about?. *The Review of Financial Studies*, *35*(4), 1723-1774.

Berk, J. B., & Green, R. C. (2004). Mutual fund flows and performance in rational markets. *Journal of political economy*, *112*(6), 1269-1295.

Berk, J. B., & Van Binsbergen, J. H. (2016). Assessing asset pricing models using revealed preference. *Journal of Financial Economics*, *119*(1), 1-23.

Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of finance*, *52*(1), 57-82.

Chacon, R.G., Morillon, T.G., Korthari, P. (Working Paper). Economies of Scale in the Real Estate Mutual Fund Industry.

Chevalier, J., & Ellison, G. (1997). Risk taking by mutual funds as a response to incentives. *Journal of political economy*, *105*(6), 1167-1200.

Chiang, Kevin CH, Kirill Kozhevnikov, Ming-Long Lee, and Craig H. Wisen. "Further evidence on the performance of funds of funds: the case of real estate mutual funds." *Real Estate Economics* 36, no. 1 (2008): 47-61.

Chou, Wen-Hsiu, and William G. Hardin. "Performance chasing, fund flows and fund size in real estate mutual funds." *The Journal of Real Estate Finance and Economics* 49, no. 3 (2014): 379-412.

Cici, G., Corgel, J., & Gibson, S. (2011). Can fund managers select outperforming REITs? Examining fund holdings and trades. *Real Estate Economics*, *39*(3), 455-486.

Chui, A. C., Titman, S., & Wei, K. J. (2003). The cross section of expected REIT returns. *Real Estate Economics*, *31*(3), 451-479.

Derwall, Jeroen, Joop Huij, Dirk Brounen, and Wessel Marquering. "REIT momentum and the performance of real estate mutual funds." *Financial Analysts Journal* 65, no. 5 (2009): 24-34.

Fama, Eugene. F. and French, Kenneth. R. "Common Risk Factors in the Returns on Stocks and Bonds." *Journal of Financial Economics* 33 no. 1 (1993): 3-56.

Fama, E. F., & French, K. R. (2010). Luck versus skill in the cross-section of mutual fund returns. The journal of finance, 65(5), 1915-1947.

Gallo, John G., Larry J. Lockwood, and Ronald C. Rutherford. "Asset allocation and the performance of real estate mutual funds." *Real Estate Economics* 28, no. 1 (2000): 165-185.

Hartzell, Jay C., Tobias Mühlhofer, and Sheridan D. Titman. "Alternative benchmarks for evaluating mutual fund performance." *Real Estate Economics* 38, no. 1 (2010): 121-154.

Kallberg, Jarl G., Crocker L. Liu, and Charles Trzcinka. "The value added from investment managers: An examination of funds of REITs." *Journal of Financial and Quantitative Analysis* (2000): 387-408.

Kaushik, Abhay, and Anita K. Pennathur. "An empirical examination of the performance of real estate mutual funds 1990-2008." *Financial Services Review* 21, no. 4 (2012).

Kaushik, Abhay, and Anita K. Pennathur. "Performance and new money cash flows in real estate mutual funds." *Journal of financial research* 36, no. 4 (2013): 453-470.

Lantushenko, Viktoriya, and Edward Nelling. "Active Management in Real Estate Mutual Funds." *The Journal of Real Estate Finance and Economics* (2019): 1-28.

Li, C. W., Tiwari, A., & Tong, L. (2017). Investment decisions under ambiguity: Evidence from mutual fund investor behavior. *Management Science*, *63*(8), 2509-2528.

Lin, Crystal, and Kenneth Yung. "Real estate mutual funds: performance and persistence." *Journal of Real Estate Research* 26, no. 1 (2004): 69-94.

Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of economic literature*, *52*(1), 5-44.

Naranjo, A., & Ling, D. C. (1997). Economic risk factors and commercial real estate returns. *The Journal of Real Estate Finance and Economics*, *14*(3), 283-307.

Ling, D. C., & Naranjo, A. (1999). The integration of commercial real estate markets and stock markets. *Real Estate Economics*, *27*(3), 483-515.

Ling, David C., and Andy Naranjo. "Dedicated REIT mutual fund flows and REIT performance." *The Journal of Real Estate Finance and Economics* 32, no. 4 (2006): 409-433.

MacGregor, Bryan D., Rainer Schulz, and Yuan Zhao. "Performance and Market Maturity in Mutual Funds: Is Real Estate Different?." *The Journal of Real Estate Finance and Economics* (2020): 1-56.

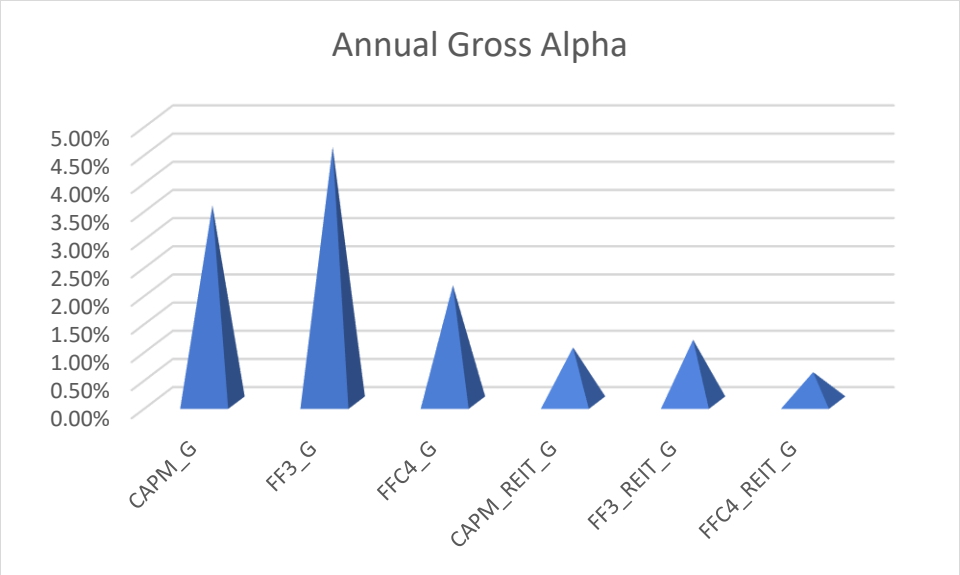
Pástor, Luboš, and Robert F. Stambaugh. "On the size of the active management industry." *Journal of Political Economy* 120, no. 4 (2012): 740-781.

Peterson, J. D., & Hsieh, C. H. (1997). Do common risk factors in the returns on stocks and bonds explain returns on REITs?. *Real Estate Economics*, *25*(2), 321-345.

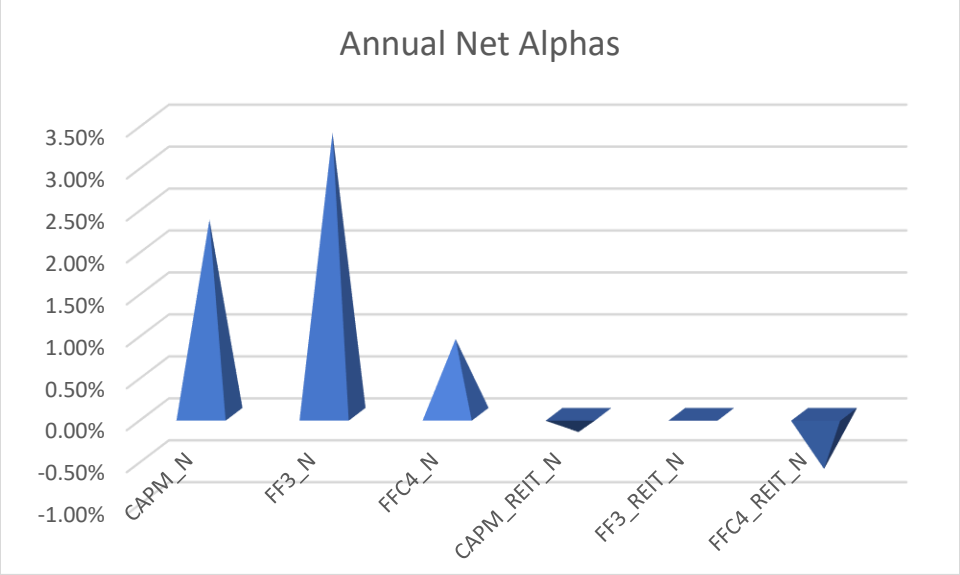
Ro, SeungHan, and Paul Gallimore. "Real estate mutual funds: Herding, momentum trading and performance." *Real Estate Economics* 42, no. 1 (2014): 190-222.

Roll, R. (1978). Ambiguity when performance is measured by the securities market line. *The Journal of finance*, *33*(4), 1051-1069.

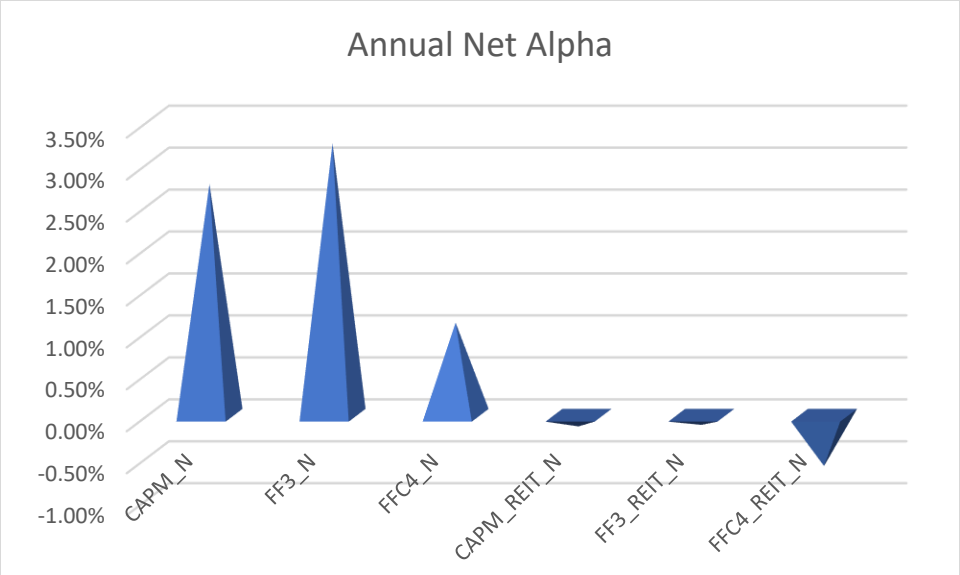
Sialm, C., Starks, L., & Zhang, H. (2015). Defined contribution pension plans: mutual fund asset allocation changes. *American Economic Review*, *105*(5), 432-36.



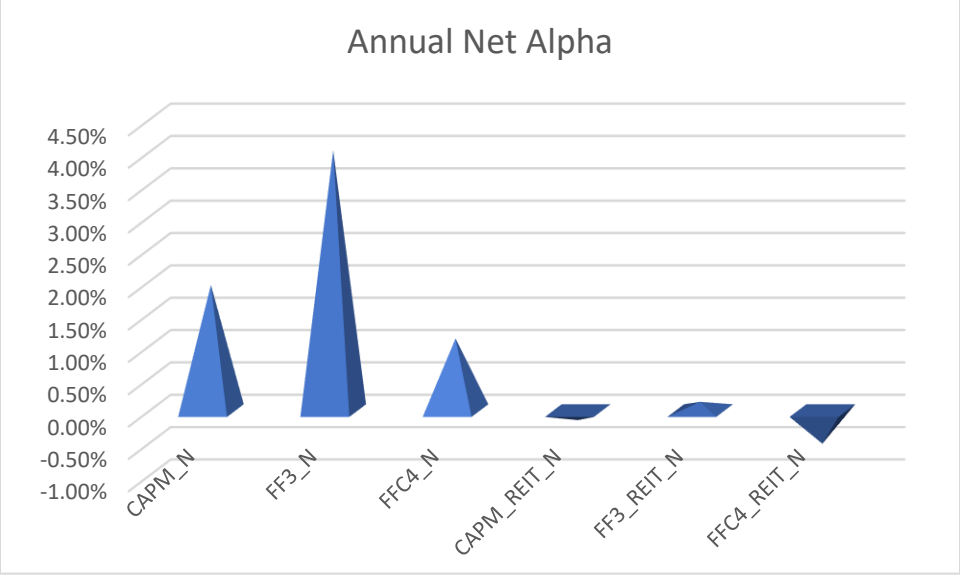
Panel A: Gross Alphas



Panel B: Net Alphas

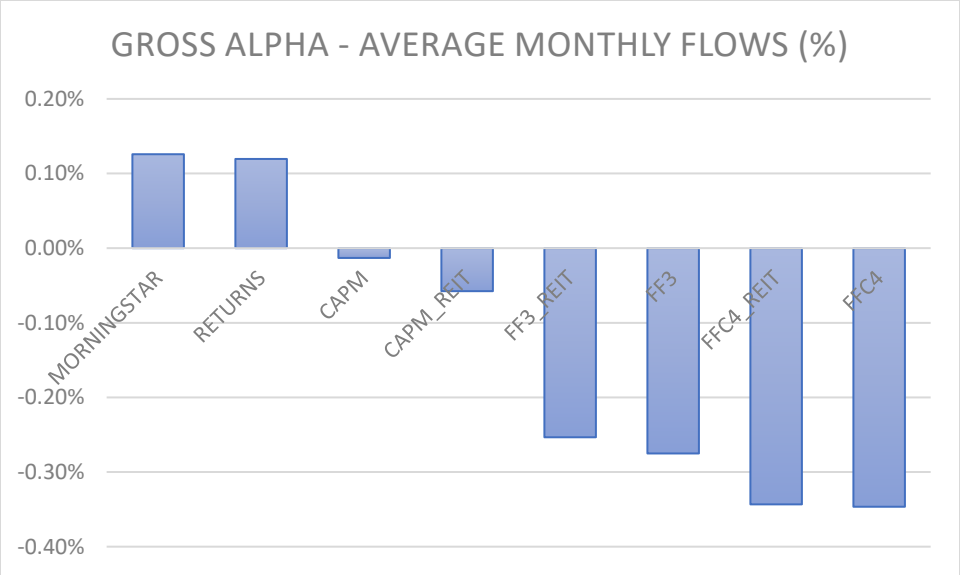


Panel C: Net Alphas – Retail

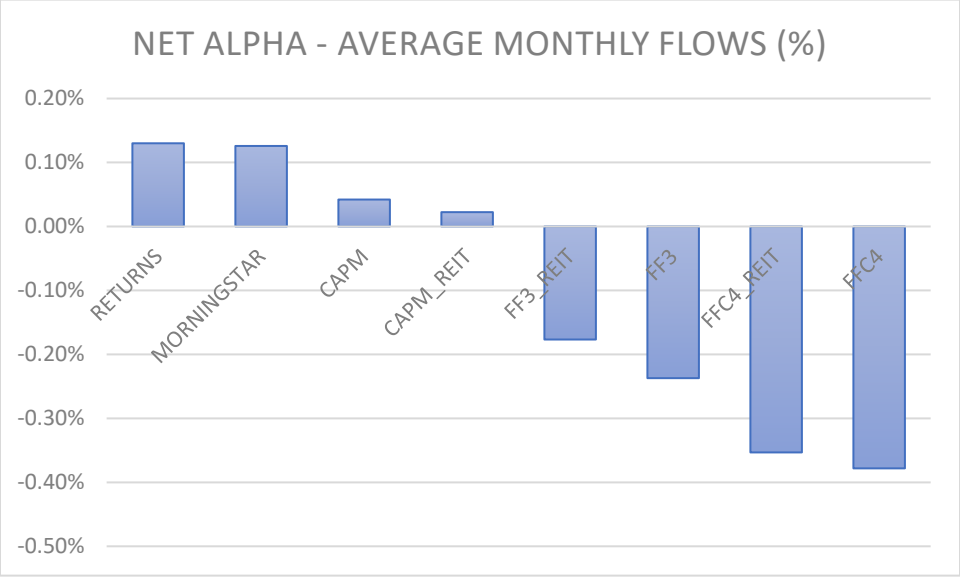


Panel D: Net Alphas - Institutional

Figure 1: Performance by benchmark model. This figure takes the average annualized alpha in percentage for each factor model. CAPM, FF3, and FFC4 are traditional factor models and CAPM REIT, FF3 REIT, and FFC4 REIT are the same factor models constructed using REITs rather than all stocks.

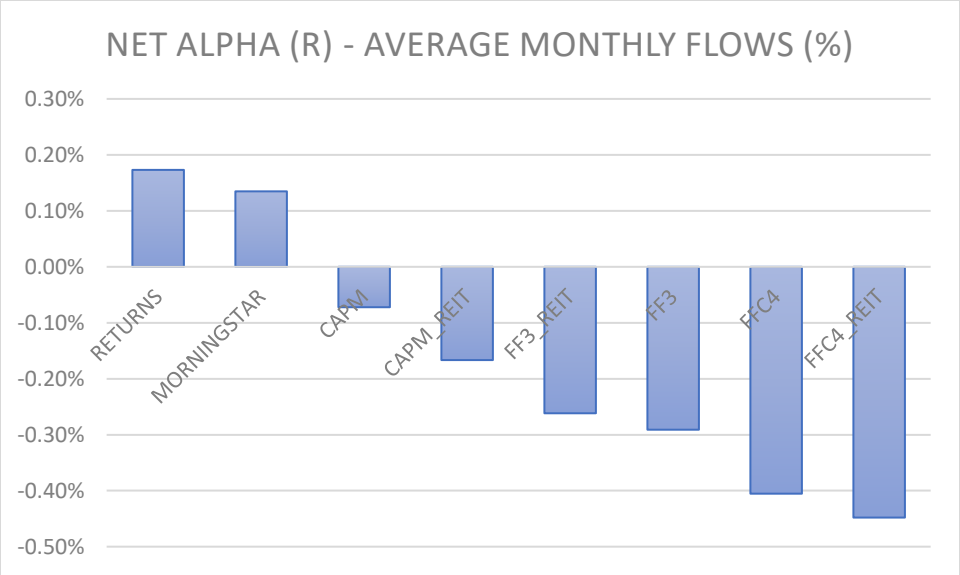


Panel A: Gross Alphas Morningstar Sample

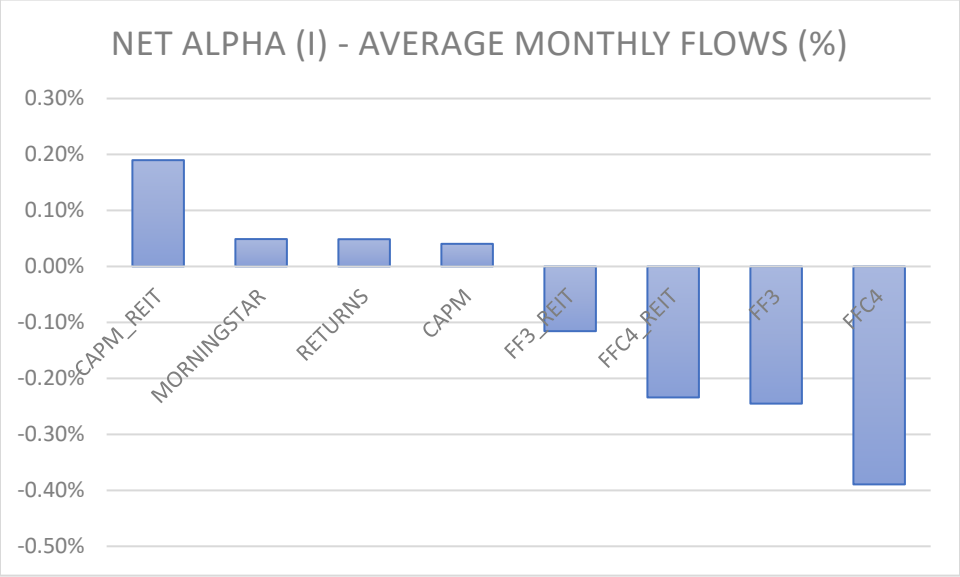


Panel B: Net Alphas Morningstar Sample

Figure 2a: This figure presents average monthly fund flows to top ranked funds for the Morningstar sample. Funds are ranked based on each performance metric and the number of funds in each top ranked category matches the number of 5-star ranked Morningstar funds.

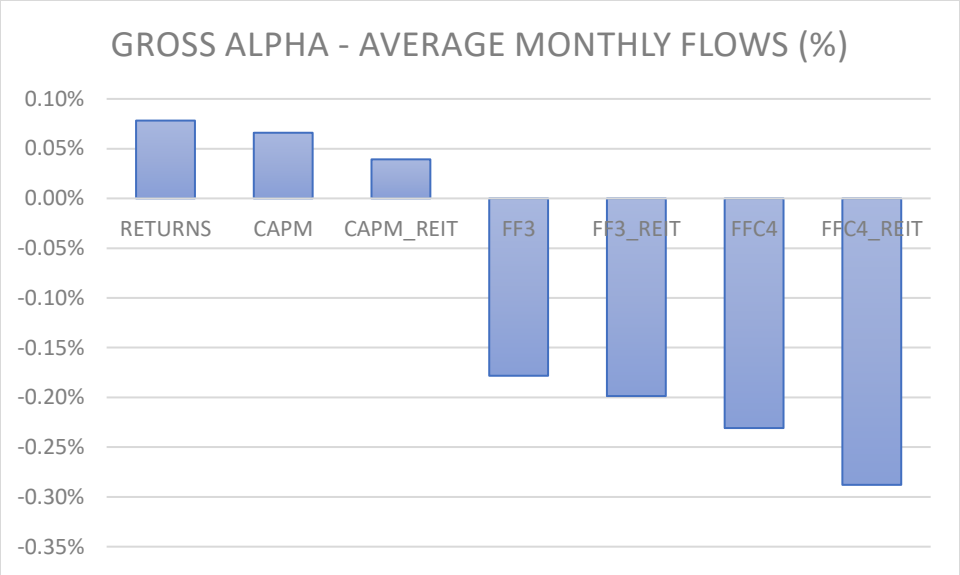


Panel C: Retail Net Alphas - Morningstar Sample

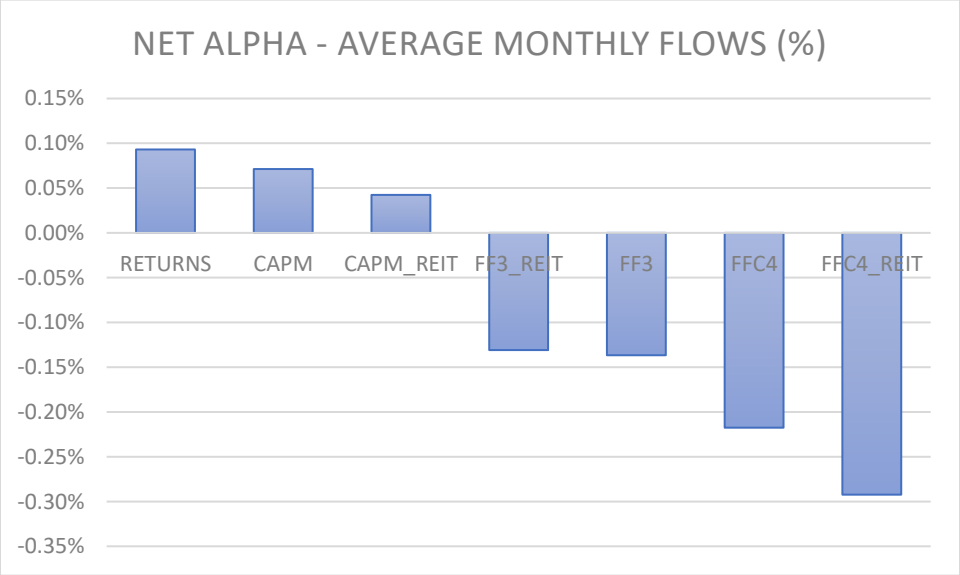


Panel D: Institutional Net Alphas - Morningstar Sample

Figure 2b: This figure presents average monthly fund flows to top ranked funds for the Morningstar sample. Funds are ranked based on each performance metric and the number of funds in each top ranked category matches the number of 5-star ranked Morningstar funds.

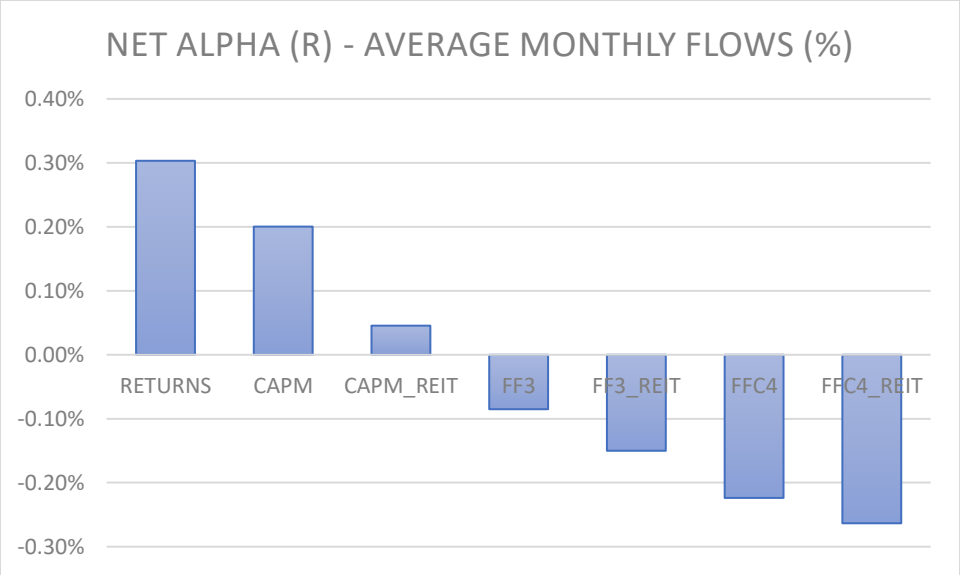


Panel A: Gross Alphas - Full Sample

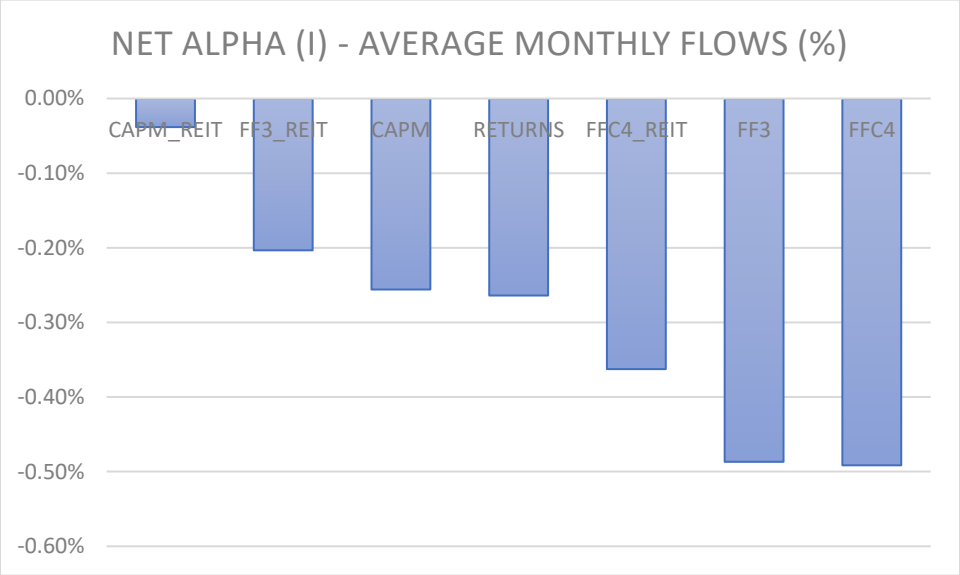


Panel B: Net Alphas - Full Sample

Figure 3a: This figure presents average monthly fund flows to top ranked funds for the Full sample. Funds are ranked based on each performance metric and the number of funds in each top ranked category matches the number of 5-star ranked Morningstar funds to be consistent with Figure 2.



Panel C: Retail Net Alphas - Full Sample



Panel D: Institutional Net Alphas - Full Sample

Figure 3b: This figure presents average monthly fund flows to top ranked funds for the Full sample. Funds are ranked based on each performance metric and the number of funds in each top ranked category matches the number of 5-star ranked Morningstar funds to be consistent with Figure 2.

Figure 4a – Flow performance sensitivity – Retail Sample

This test examines fund flows at the aggregate time-series level. We take the average of all alphas for each performance measure for a given month. We sort these alphas into quartiles and plot them against average overall fund flows.

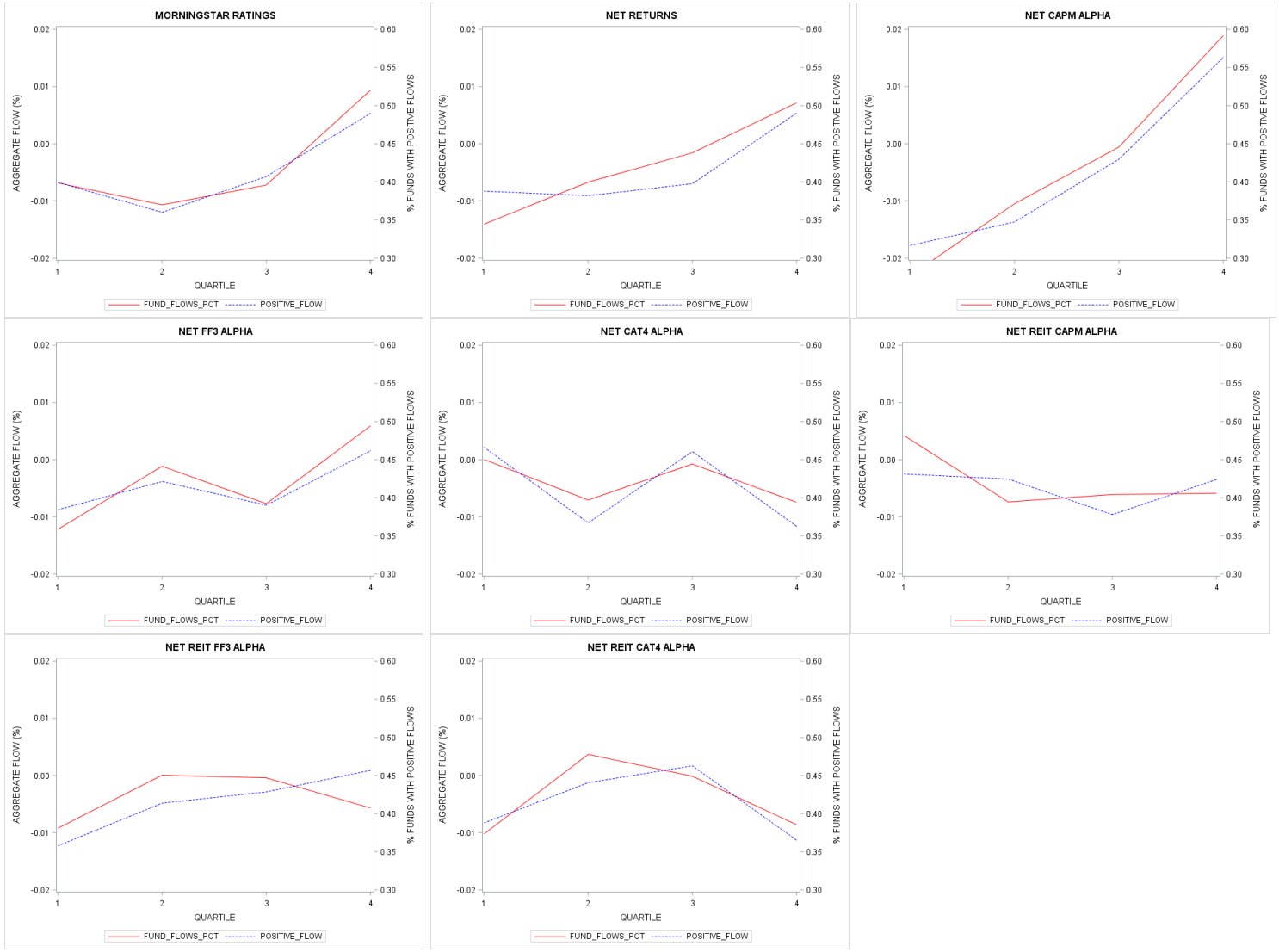


Figure 4b – Flow performance sensitivity – Institutional Sample

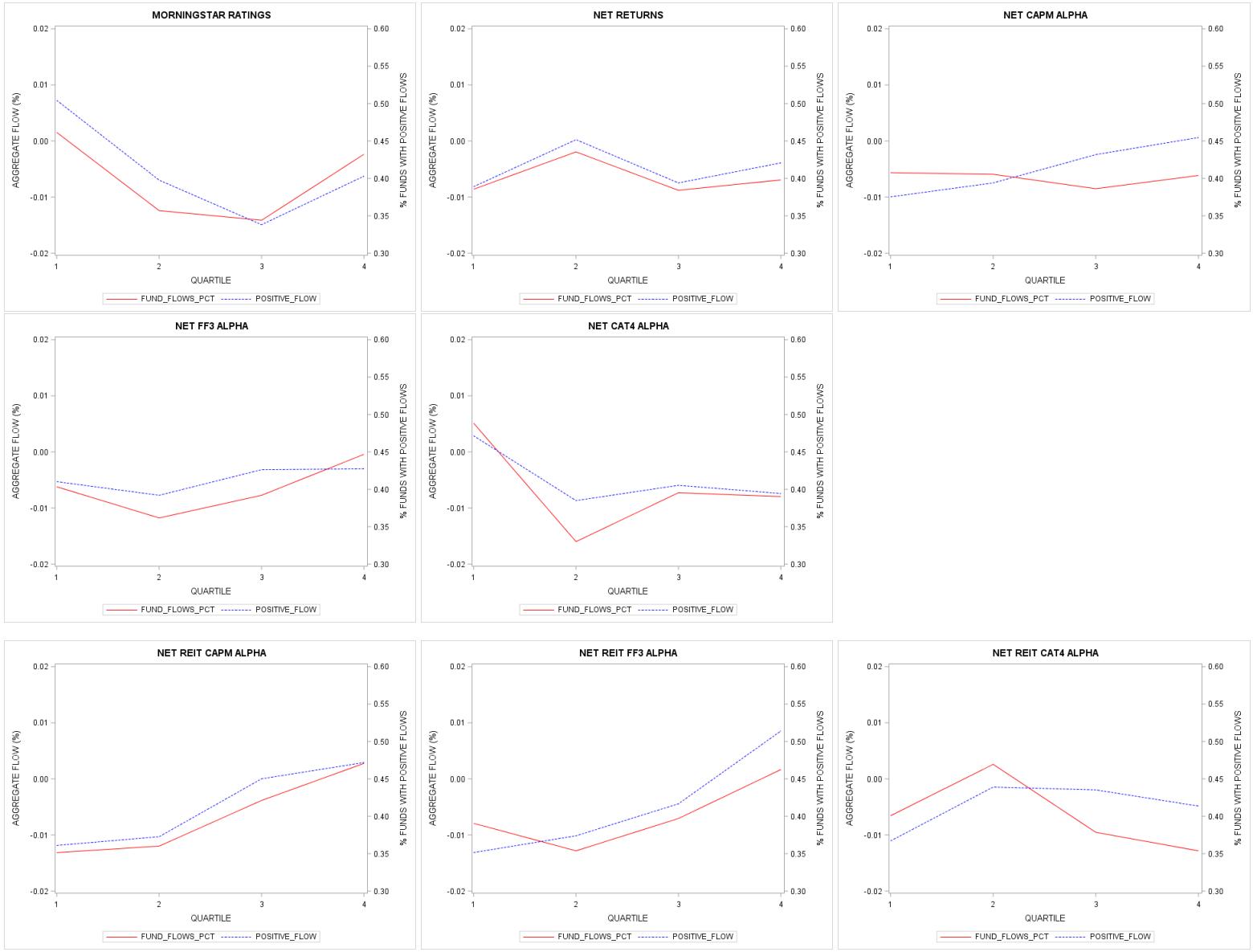


Table 1: Literature Summary on REMF Performance and Benchmark Models

Paper	Data Source	Sample Period	Performance	Benchmark Model*
Chou and Hardin (2014)	CRSP	1994-2006	Zero	Fama French Carhart model with REIT based Factors and SIC code factors
O'Neal and Page (2000)	Morningstar	1996-1998	Zero	Custom multifactor market model (REIT, Russel 2000, S&P500, World)
Kallberg, Liu, and Trzcinka (2000)	Morningstar	1987-1998	Positive	Custom multifactor model (size, value, bond) with REIT index as market factor
Lantushenko and Nelling (2019)	CRSP	1995-2015	Zero	Fama French Carhart Model with REIT based factors and traditional Factors
Lin and Yung (2004)	WSJ and Yahoo	1993-2001	Negative	Fama French Carhart Model with REIT index as market factor
MacGregor, Schulz, and Zhao (2020)	CRSP	1992-2016	Zero	Fama French Carhart Model + Liquidity factor using traditional factors
Kaushik and Pennathur (2012)	CRSP	1990-2008	Positive	Fama French Carhart sModel with REIT as market factor
Hartzell, Mulhlhofer, and Titman (2010)	CRSP	1994-2005	Zero	Fama French Carhart Model with REIT based factors + property type factors + non-REIT factors
Derwall, Huij, Brounen, and Marquering (2009)	CRSP	1980-2008	Zero	Fama French Carhart Model with REIT based momentum and traditional factors for the others
Chiang, Kozhevnikov, Lee, and Wisen (2008)	Morningstar	1982-2003	Zero	Fama French 3-Factor Model with traditional factors
Gallo, Lockwood, and Rutherford (2000)	Morningstar	1991-1997	Positive	CAPM with REIT index as market factor
Rodriguez (2007)	CRSP/Morningstar	1999-2004	Zero	CAPM with REIT index as market factor

* Several papers use more than one benchmark model. This column represents the factor model used with the most factors. For example, Lantushenko and Nelling (2019) also use traditional CAPM models and CAPM models with a REIT index as a market factor.

Table 2: Sample Statistics

This table presents summary statistics for all variables used throughout the study. CAPM, FF3, and FFC4 refer to traditional factor models as defined in the text and CAPM REIT, FF3 REIT, and FFC4 REIT refer to REIT-based factor models. Panel A reports the summary statistics for the Full Sample, Panel B and C report the summary statistics for the Retail Sample and the Institutional Sample respectively. Note that there are N=868 observations (5.95%) with missing data when breaking down the sample between Retail and Institutional funds.

Panel A: Full Sample						
Variable	N	Mean	Std Dev	Q1	Median	Q3
Gross Return Variables						
Gross Returns	14,589	0.85%	1.59%	0.20%	0.98%	1.82%
CAPM	14,589	0.29%	1.11%	-0.49%	0.38%	1.08%
FF3	14,589	0.38%	1.08%	-0.36%	0.33%	1.07%
FFC4	14,589	0.17%	1.54%	-0.92%	-0.07%	1.12%
CAPM REIT	14,589	0.08%	0.48%	-0.12%	0.08%	0.27%
FF3 REIT	14,589	0.09%	0.50%	-0.09%	0.09%	0.29%
FFC4 REIT	14,589	0.05%	0.67%	-0.27%	0.09%	0.42%
Net Return Variables						
Net Returns	14,589	0.75%	1.59%	0.11%	0.89%	1.72%
CAPM	14,589	0.19%	1.11%	-0.58%	0.28%	0.97%
FF3	14,589	0.28%	1.08%	-0.46%	0.24%	0.97%
FFC4	14,589	0.07%	1.54%	-1.02%	-0.17%	1.02%
CAPM REIT	14,589	-0.02%	0.48%	-0.22%	-0.02%	0.17%
FF3 REIT	14,589	-0.01%	0.50%	-0.19%	0.00%	0.19%
FFC4 REIT	14,589	-0.05%	0.67%	-0.37%	-0.01%	0.32%
Fund Flows (%)	14,589	-0.77%	6.16%	-4.20%	-1.23%	2.25%
Morningstar Ratings	9,340	2.87	1.00	2.00	3.00	3.75

Table 2 – Cont'd

Panel B: Retail sample						
Variable	N	Mean	Std Dev	Q1	Median	Q3
Gross Return Variables						
Gross Returns	8,684	0.86%	1.68%	0.18%	1.03%	1.90%
CAPM	8,684	0.34%	1.14%	-0.44%	0.41%	1.13%
FF3	8,684	0.38%	1.05%	-0.32%	0.33%	1.03%
FFC4	8,684	0.20%	1.56%	-0.87%	-0.04%	1.14%
CAPM REIT	8,684	0.10%	0.57%	-0.11%	0.10%	0.31%
FF3 REIT	8,684	0.10%	0.60%	-0.10%	0.11%	0.32%
FFC4 REIT	8,684	0.06%	0.76%	-0.28%	0.11%	0.46%
Net Return Variables						
Net Returns	8,684	0.76%	1.68%	0.08%	0.92%	1.79%
CAPM	8,684	0.23%	1.13%	-0.54%	0.31%	1.02%
FF3	8,684	0.27%	1.05%	-0.43%	0.23%	0.92%
FFC4	8,684	0.09%	1.56%	-0.98%	-0.15%	1.03%
CAPM REIT	8,684	-0.01%	0.57%	-0.22%	-0.01%	0.20%
FF3 REIT	8,684	-0.01%	0.60%	-0.21%	0.00%	0.22%
FFC4 REIT	8,684	-0.05%	0.76%	-0.39%	0.00%	0.36%
Fund Flows (%)	8,684	-0.68%	6.18%	-4.23%	-1.18%	2.37%
Morningstar Ratings	5,941	2.75	1.00	2.00	2.92	3.50

Panel C: Institutional sample						
Variable	N	Mean	Std Dev	Q1	Median	Q3
Gross Return Variables						
Gross Returns	5,037	0.84%	1.53%	0.24%	0.93%	1.70%
CAPM	5,037	0.24%	1.07%	-0.52%	0.35%	1.00%
FF3	5,037	0.42%	1.12%	-0.37%	0.37%	1.16%
FFC4	5,037	0.17%	1.57%	-0.97%	-0.10%	1.19%
CAPM REIT	5,037	0.07%	0.33%	-0.11%	0.06%	0.22%
FF3 REIT	5,037	0.09%	0.34%	-0.07%	0.08%	0.25%
FFC4 REIT	5,037	0.04%	0.53%	-0.25%	0.07%	0.34%
Net Return Variables						
Net Returns	5,037	0.76%	1.53%	0.16%	0.86%	1.62%
CAPM	5,037	0.16%	1.07%	-0.61%	0.28%	0.92%
FF3	5,037	0.34%	1.12%	-0.45%	0.29%	1.09%
FFC4	5,037	0.09%	1.57%	-1.05%	-0.17%	1.10%
CAPM REIT	5,037	-0.01%	0.33%	-0.19%	-0.01%	0.14%
FF3 REIT	5,037	0.01%	0.34%	-0.16%	0.01%	0.17%
FFC4 REIT	5,037	-0.04%	0.53%	-0.33%	-0.01%	0.26%
Fund Flows (%)	5,037	-1.01%	6.24%	-4.17%	-1.30%	1.98%
Morningstar Ratings	2,989	2.97	0.95	2.00	3.00	3.75

Table 3: Correlation Matrix

This table presents Pearson correlation coefficients for each of the performance metrics in the study. All performance metrics in this table are on a net return basis as the gross return variables are similar. CAPM, FF3, and FFC4 refer to traditional factor models as defined in the text and CAPM REIT, FF3 REIT, and FFC4 REIT refer to REIT-based factor models.

Panel A: Full Sample								
Performance Measure	Morningstar	Net Returns	CAPM	FF3	FFC4	CAPM REIT	FF3 REIT	FFC4 REIT
Morningstar	1.00	0.04	0.07	0.03	0.03	0.17	0.12	0.06
Net Returns	0.04	1.00	0.62	0.34	0.41	0.41	0.35	0.27
CAPM	0.07	0.62	1.00	0.67	0.38	0.39	0.33	0.42
FF3	0.03	0.34	0.67	1.00	0.67	0.29	0.26	0.32
FFC4	0.03	0.41	0.38	0.67	1.00	0.27	0.22	0.13
CAPM REIT	0.17	0.41	0.39	0.29	0.27	1.00	0.83	0.65
FF3 REIT	0.12	0.35	0.33	0.26	0.22	0.83	1.00	0.73
FFC4 REIT	0.06	0.27	0.42	0.32	0.13	0.65	0.73	1.00

Table 4: Flows to top and bottom ranked funds.

This table presents average fund flows to top and bottom performing funds ranked by each performance metric. Top performance is defined by the number of 5-star Morningstar funds and bottom ranked is defined by the number of 1-star Morningstar ratings. All alphas and returns are on a net basis as gross returns and alphas were similar. CAPM, FF3, and FFC4 refer to traditional factor models as defined in the text and CAPM REIT, FF3 REIT, and FFC4 REIT refer to REIT-based factor models.

Morningstar Sample (N = 9,340)			
Performance Measure	Top	Bottom	Difference
RETURNS	0.13	-1.80	1.93
MORNINGSTAR	0.13	-1.64	1.76
CAPM	0.04	-1.55	1.59
CAPM_REIT	0.02	-1.51	1.54
FF3_REIT	-0.18	-1.44	1.26
FF3	-0.24	-1.40	1.16
FFC4_REIT	-0.35	-1.43	1.08
FFC4	-0.38	-1.30	0.92

Full Sample (N = 14,589)			
Performance Measure	Top	Bottom	Difference
RETURNS	0.09	-1.62	1.71
CAPM_REIT	0.06	-1.64	1.70
CAPM	0.07	-1.52	1.59
FF3_REIT	-0.13	-1.45	1.31
FF3	-0.14	-1.43	1.30
FFC4_REIT	-0.29	-1.49	1.20
FFC4	-0.22	-1.24	1.03

Table 4 – Cont'd

Panel B: Retail sample

Morningstar Sample (N = 5,939)			
Performance Measure	wTop	Bottom	Difference
RETURNS	0.17	-1.62	1.80
MORNINGSTAR	0.13	-1.65	1.78
CAPM	-0.07	-1.47	1.40
CAPM_REIT	-0.17	-1.53	1.36
FF3_REIT	-0.26	-1.35	1.09
FF3	-0.29	-1.32	1.03
FFC4_REIT	-0.45	-1.35	0.90
FFC4	-0.41	-1.06	0.66

Full Sample (N = 8,684)			
Performance Measure	Top	Bottom	Difference
RETURNS	0.30	-1.55	1.85
CAPM	0.20	-1.45	1.65
CAPM_REIT	0.04	-1.61	1.65
FF3	-0.09	-1.33	1.24
FF3_REIT	-0.15	-1.35	1.20
FFC4_REIT	-0.26	-1.31	1.04
FFC4	-0.22	-1.01	0.79

Panel C: Institutional sample

Morningstar Sample (N = 2,984)			
Performance Measure	Top	Bottom	Difference
CAPM_REIT	0.19	-2.12	2.31
RETURNS	0.05	-2.26	2.31
CAPM	0.04	-2.17	2.21
MORNINGSTAR	0.05	-2.08	2.13
FF3_REIT	-0.12	-1.87	1.75
FF3	-0.25	-1.88	1.63
FFC4_REIT	-0.23	-1.84	1.60
FFC4	-0.39	-1.65	1.27

Full Sample (N = 5,037)			
Performance Measure	Top	Bottom	Difference
CAPM_REIT	-0.04	-1.89	1.85
FF3_REIT	-0.20	-1.84	1.64
CAPM	-0.26	-1.82	1.56
FFC4_REIT	-0.26	-1.80	1.53
RETURNS	-0.36	-1.88	1.52
FF3	-0.49	-1.64	1.16
FFC4	-0.49	-1.47	0.98

Table 5: Horse Race Tests

This table presents a series of horse race tests for two performance metrics at a time. We estimate panel regressions of fund flows on indicators of whether a fund is a top-ranked fund by each performance measure and controlling for month fixed effects. We report the difference in the coefficients of the first and the second indicators with the t-statistic in parentheses. Standard errors are clustered by fund and month. CAPM, FF3, and FFC4 refer to traditional factor models as defined in the text and CAPM REIT, FF3 REIT, and FFC4 REIT refer to REIT-based factor models.

Panel A: Combined Sample

Model Comparison	Difference	T-Stat	Model Comparison	Difference	T-Stat
Net Returns vs. All			Morningstar vs. All		
Net Returns vs. Morningstar	-0.05	-0.84	Morningstar vs Net returns	0.05	0.84
Net Returns vs. CAPM	-0.01	-0.02	Morningstar vs CAPM	0.01	0.02
Net returns vs FF3	0.71	**3.55**	Morningstar vs FF3	0.12	0.28
Net returns vs CAT4	0.76	**3.46**	Morningstar vs FFC4	0.38	0.93
Net returns vs CAPM REIT	0.22	0.82	Morningstar vs CAPM REIT	0.55	1.30
Net returns vs FF3 REIT	0.62	**2.81**	Morningstar vs FF3 REIT	0.41	1.12
Net returns vs CAT4 REIT	0.87	**4.03**	Morningstar vs FFC4 REIT	0.52	1.49
CAPM vs. All			CAPM REIT vs. All		
CAPM vs Net returns	-0.33	-0.84	CAPM REIT vs Net returns	-0.22	-0.82
CAPM vs Morningstar	-0.01	-0.02	CAPM REIT vs Morningstar	-0.55	-1.30
CAPM vs FF3	0.67	**4.81**	CAPM REIT vs CAPM	0.04	0.11
CAPM vs CAT4	0.64	**3.18**	CAPM REIT vs FF3	0.52	0.78
CAPM vs CAPM REIT	-0.04	-0.11	CAPM REIT vs CAT4	0.58	1.37
CAPM vs FF3 REIT	0.44	1.64	CAPM REIT vs FF3 REIT	0.75	**2.59**
CAPM vs CAT4 REIT	0.72	**2.76**	CAPM REIT vs CAT4 REIT	0.98	**3.16**

Table 5 – Cont'd

Panel B: Retail sample

Model Comparison	Difference	T-Stat	Model Comparison	Difference	T-Stat
Net Returns vs. All			Morningstar vs. All		
Net Returns vs. Morningstar	0.08	0.17	Morningstar vs Net returns	-0.08	-0.17
Net Returns vs. CAPM	0.47	**1.89**	Morningstar vs CAPM	0.13	0.26
Net returns vs FF3	1.06	**4.82**	Morningstar vs FF3	0.55	1.23
Net returns vs CAT4	1.23	**4.00**	Morningstar vs FFC4	0.80	1.62
Net returns vs CAPM REIT	0.90	**2.48**	Morningstar vs CAPM REIT	0.50	1.07
Net returns vs FF3 REIT	1.08	**3.24**	Morningstar vs FF3 REIT	0.79	1.47
Net returns vs CAT4 REIT	1.27	**4.11**	Morningstar vs FFC4 REIT	0.80	1.61
CAPM vs. All			CAPM REIT vs. All		
CAPM vs Net returns	**-0.47**	**-1.89**	CAPM REIT vs Net returns	**-0.90**	**-2.48**
CAPM vs Morningstar	-0.13	-0.26	CAPM REIT vs Morningstar	-0.50	-1.07
CAPM vs FF3	0.98	**3.86**	CAPM REIT vs CAPM	-0.56	-1.42
CAPM vs CAT4	1.02	**3.53**	CAPM REIT vs FF3	0.27	0.97
CAPM vs CAPM REIT	0.56	1.42	CAPM REIT vs CAT4	0.50	1.58
CAPM vs FF3 REIT	0.86	**2.18**	CAPM REIT vs FF3 REIT	0.69	**1.97**
CAPM vs CAT4 REIT	1.05	**2.78**	CAPM REIT vs CAT4 REIT	0.85	**2.22**

Table 5 – Cont'd

Panel C: Institutional Sample					
Model Comparison	Difference	T-Stat	Model Comparison	Difference	T-Stat
Net Returns vs. All			Morningstar vs. All		
Net Returns vs. Morningstar	-0.11	-0.20	Morningstar vs Net returns	0.11	0.20
Net Returns vs. CAPM	0.12	0.36	Morningstar vs CAPM	-0.08	-0.13
Net returns vs FF3	0.76	**3.71**	Morningstar vs FF3	0.40	0.81
Net returns vs CAT4	0.64	**2.10**	Morningstar vs FFC4	0.44	0.76
Net returns vs CAPM REIT	**-0.57**	**-3.45**	Morningstar vs CAPM REIT	-0.42	-0.58
Net returns vs FF3 REIT	-0.04	-0.21	Morningstar vs FF3 REIT	0.06	0.10
Net returns vs CAT4 REIT	0.29	1.05	Morningstar vs FFC4 REIT	0.27	0.45
CAPM vs. All			CAPM REIT vs. All		
CAPM vs Net returns	-0.12	-0.36	CAPM REIT vs Net returns	0.57	**3.45**
CAPM vs Morningstar	0.08	0.13	CAPM REIT vs Morningstar	0.42	0.58
CAPM vs FF3	0.93	**2.10**	CAPM REIT vs CAPM	0.70	**2.13**
CAPM vs CAT4	0.65	1.42	CAPM REIT vs FF3	1.29	**3.44**
CAPM vs CAPM REIT	**-0.70**	**-2.13**	CAPM REIT vs CAT4	1.08	**2.74**
CAPM vs FF3 REIT	-0.14	-0.35	CAPM REIT vs FF3 REIT	0.77	**1.89**
CAPM vs CAT4 REIT	0.24	0.77	CAPM REIT vs CAT4 REIT	0.88	**2.15**

Table 6: Determinants of aggregate flows to active funds

This table presents time series regressions of monthly aggregate flows to active funds onto monthly aggregate fund performance measured as of the end of the previous month. Eight measures of fund performance are considered: net returns, Morningstar ratings, and alphas from the CAPM model, the three-factor Fama-French model, the four factor Fama-French-Carhart model, REIT CAPM model, the three-factor REIT Fama-French model, and the REIT four factor Fama-French-Carhart model. To facilitate the comparison of effects, we measure the dependent variable in percentage points, and all continuous explanatory variables are transformed into a standard score. The specifications include calendar-month fixed effects. T-statistics based on Newey-West standard errors with a six-lag correction are presented in parentheses. Panel A reports the results for the *Retail Sample*, with Net Returns as the focal variable. Panel B reports the results for the *Institutional Sample* with REIT CAPM as the focal variable.

Panel A: Retail Sample - Net Returns vs All								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Net Returns	0.008**	0.008**	0.004	0.007*	0.011**	0.010**	0.010**	0.008**
	(2.20)	(2.11)	(0.82)	(1.66)	(2.36)	(2.39)	(2.51)	(2.17)
Morningstar		0.001						
		(0.29)						
CAPM			0.011					
			(1.27)					
FF3				0.004				
				(0.97)				
CAT4					-0.006			
					(-1.42)			
REIT CAPM						-0.004		
						(-1.10)		
REIT FF3							-0.005	
							(-1.16)	
REIT CAT4								-0.000
								(-0.16)
Calendar month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of months	289	289	289	289	289	289	289	289
Adj R^2	0.014	0.011	0.012	0.016	0.020	0.016	0.018	0.011

Table 6 – *Cont'd*

Panel B: Institutional Sample - CAPM REIT vs All								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CAPM REIT	0.005**	0.006**	0.008**	0.006**	0.008**	0.009***	0.005**	0.007**
	(2.02)	(2.15)	(2.12)	(2.02)	(2.27)	(3.25)	(1.93)	(2.47)
Morningstar		-0.004						
		(-1.10)						
Net Returns			-0.004					
			(-0.83)					
CAPM				-0.002				
				(-0.62)				
FF3					-0.005			
					(-1.25)			
CAT4						-0.008***		
						(-2.91)		
REIT FF3							-0.001	
							(-0.29)	
REIT CAT4								-0.006*
								(-1.96)
Calendar month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of months	298	288	298	298	298	298	298	298
Adj R^2	0.049	0.057	0.051	0.048	0.052	0.069	0.047	0.062