(Not) Everybody's Working for the Weekend: A Study of Mutual Fund Manager Effort

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Abstract

We develop a novel measure of effort and revisit the fundamental questions of asset management: how do incentives relate to effort; and how does effort affect performance? Using unique observations of daily work activity, we define mutual fund manager effort as the ratio of weekend work to weekday work. We find that investment advisors with stronger competitive incentives exert more effort on weekends. Focusing on within-advisor variation, we find that more effort follows poor performance, outflows and higher volatility. Regarding future performance, we show that more effort is associated with higher future returns, especially for mutual funds with strong competitive incentives, higher active share, and lower turnover. Finally, we demonstrate a causal link between effort and performance using exogenous variation in effort due to weather conditions.

JEL classification: G00, G20, G23

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1 Introduction

In their seminal paper on the principal-agent problem, Grossman and Hart (1983) propose an optimal incentive scheme between an owner and a manager. A key aspect of the problem they examine is that the principal (e.g., the owner of the firm) cannot observe the effort level of the agent (e.g., the manager). While much of the theoretical literature on agency costs is cast in a generalizable setting, the issue of agency costs is of particular interest in asset management (i.e., Spatt (2020)). In the asset management industry, the agent (e.g., fund manager) is typically selected based on their greater expertise and understanding of financial markets generally and investing specifically, exacerbating the potential for unobservability of effort. Moreover, relative to other organizational settings, the most important input in the asset management production function is human capital. This is, in part, why so much research has been devoted to trying to distinguish between luck and skill in identifying manager ability (for a review of this literature, see Cremers, Fulkerson, and Riley (2019)).

While fund manager effort may not be observable to investors in the moment they make their investment decisions, what if as researchers, we were privy to previously unrecognized measures of effort? While the principal-agent literature arose, in part, due to the difficulty of measuring effort, we propose and then test a novel measure of effort for fund managers. In this paper, we use this novel measure of manager effort, whether they are working on the weekend, to revisit the central economic questions of asset management: how do incentives relate to effort; and how does effort affect performance?

In 1993, the SEC modernized both the process of both submitting and retrieving regulatory forms. Their new system for Electronic Data Gathering, Analysis, and Retrieval, or EDGAR, enabled easier access to corporate filings for interested parties. Given the importance of these filings in disseminating information to market participants (i.e., Crane et al. (2023) and Bowles et al. (2023)), simplifying access to them was of particular importance to fund managers. As a novel measure of manager effort, we use a database of the EDGAR log access files, which enables us to identify which managers from which investment advisors are accessing filings and when that access occurred. Consequently, we can identify when investment advisor employees are working on the weekend.

Our sample consists of the 115 investment advisors from January 2010 through June 2017 (the time period over which EDGAR login data was disclosed). While fund management is a highly paid salaried occupation where work outside of routine office hours may be regularly expected, we still find considerable time series and cross-sectional variation in the weekend work activities of fund managers. Of the 115 advisors in our sample, 107 of them ever have employees working on the weekend. Because much of our analysis is conducted using monthly data, we define our 'working on the weekend' variable as 1 if employees at the investment advisor worked at least one weekend of the month. Using this definition, across the 90 months in our sample period, the average (median) advisor employees worked on the weekend 69% of the time or 68 out of the 90 months (76% or 68 out of 90).

In examining the determinants of employee effort, we find investment advisors with stronger competitive incentives (Evans et al. (2020)) and a higher fraction of investment professionals employed by the investment advisor have a higher rate of weekend work. Focusing on the within investment advisor variation, we also find that managers at funds that have recently experienced outflows, underperformance and higher idiosyncratic volatility also exhibit higher effort.

Moving from effort to performance, we find that higher effort is associated with both short-term and long-term risk-adjusted outperformance. Because effort may benefit certain funds/advisors more than others, we then examine subsamples of funds where effort is more likely to generate outperformance, namely small, low turnover funds, with highly competitive incentives, high active share and a concentrated strategy. Taking this heterogeneity into account, the effort and outperformance result becomes even more pronounced.

Recognizing that the observed relationship between effort and is plausibly endogenous, we use a unique instrumental variables approach. The ideal instrument would represent an exogenous shock to the costs of effort (e.g., forgone leisure) without relating to future profitable investment opportunities. We propose local weather, specifically rain, as such an instrument. Both the psychology literature and the financial economics literature show that bad weather increases productivity (i.e., Lee et al. (2014) and Zhang (2022)). Certainly for an employee who is considering the opportunity cost of working on the weekend, such a cost decreases if bad weather eliminates the possibility of pleasurable outdoor leisure. At the same time, local weather conditions seem highly unlikely to be related to the prevalence of profitable investment opportunities in public equity markets.

The first stage of our IV approach provides evidence that rain is associated with an increased rate of weekend work, consistent with the prior literature (i.e., Lee et al. (2014) and Zhang (2022)) and our proposed instrumental mechanism. Using this instrument, we then assess the causal nature of our performance relationship find that exogenously higher effort is associated with risk-adjusted outperformance, especially for the subset of funds that we expect to benefit most from increased effort.

One important aspect of our measure is that it is subject to type II errors, namely some investment advisory employees are working on the weekend, but we do not observe it. However, this will at worst bias our results towards the null hypothesis that there is no relationship between weekend work and performance.

Our paper contributes to the small but growing empirical literature that examines the effort, incentives, and outcomes of financial professionals. Ben-Rephael et al. (2023) examine the Bloomberg usage of corporate executives to identify effort, finding that the equity returns of those companies with executives that exert the greatest effort according to their measure, outperform. Ohneberg and Saffi (2023) use meaures of employee satisfaction by investment advisory firm to show that funds offered by firms where employees exhibit higher rates of satisfaction outperform as well. Also, an earlier literature examined contracts between investment advisors and investors, largely due to the absence of empirical measures of the underlying fund managers compensation. But recent work Ma et al. (2019) and Ibert et al. (2018) analyze manager compensation for samples of US and Swedish managers respectively.

The rest of the paper proceeds as follows. Section 2 describes how we construct our novel measure of mutual fund effort. Section 3 describes the database we construct for the analysis. Section 4 describes the determinants of our effort measure. Sections 5 and 6 provide results on the outcomes of effort including future performance. Section 7 describes our instrumental variables approach and Section 8 concludes.

2 Measuring Mutual Fund Effort

In an ideal setting, researchers would measure mutual fund effort via personal observations from data collectors. These data collectors would position themselves inside the offices of mutual funds and count the number of employees coming in to work. The data collectors may even discern effort subjectively by observing how hard the employees are working, or, somewhat less subjectively, by asking employees, "On a scale of 1 to 10, how hard are you working today?"

While this ideal setting would provide researchers with useful data on work activity and effort, the high cost and invasive nature of collecting this data – especially for a large sample of mutual funds and over a long period of time – are overwhelming. As such, mutual fund effort has not been studied empirically in financial economics.[1]

Fortunately, using the ideal setting as a guide, we have collected a large panel of data measuring work activity and effort. The key to creating this data is recognizing that the EDGAR Log Files – a powerful database with records of web traffic on the SEC's EDGAR filing system – are a collection of time-stamped work activities. Properly handled, each observation in the EDGAR Log Files can represent an employee at a specific investment advisor doing measurable work at a specific data and time. With this insight, we measure work activity and effort within advisors and across time.[2]

[1]Effort in general has not been widely studied in financial economics either. The rare exception is a recent paper (Ben-Rephael et al. (2023)) that uses Bloomber online status data to study the effort of top executives in public companies.

[2]To interpret the observations from the EDGAR Log Files as observations of work activity we assume

2.1 The EDGAR Log Files

The EDGAR Log Files contain billions of observations of "requests" or "requests to view a filing." Each observation details the filing requested, the date and time of the request, and the requester.[3] We focus on the requester – recorded as the IP address making the electronic request – and the date of each request. Then, after linking requester IP addresses to a hand-matched sample of mutual fund families, we aggregate observations monthly and within each family. For each family and for every month we calculate the total number of requests made and the total number of unique IP addresses making requests each day. We call the former measure total requests ($TotalReqs$) and the latter total work-days ($TotalWDs$) given its similarity to the number of total employee work-days.[4]

Before discussing these measures of work activity in more detail, let us make three points. First, these two measures of work activity closely resemble the hypothetical measures from the ideal setting proposed earlier. Total work-days mimics the data collector counting the number of employees coming to work, while total requests mimics the data collector observing the amount of work being accomplished.

Second, these monthly measures are aggregated at the level of the mutual fund *family*. This method yields the best possible match with the IP addresses from the EDGAR Log Files. That said, for one test we also match IP addresses at the *fund* level.[5]

Third, this section provides only necessary details about the EDGAR Log Files. Appendix A.1 provides a full description of the database and the important process of unmasking IP addresses and matching with mutual fund families.

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that the specific activity being recorded – employees within mutual fund families reviewing public filings on EDGAR – is positively correlated with other mutual funds' work activities.

[3]For example, the request is for the 2013 annual report (10-K) for IBM. The request was made at 10:14am on March 1, 2014. The request originated from IP address 123.123.123.*abc*.

[4]If five different employees each came to work on Monday and Tuesday, total employee work-days would be ten. Our measure of $TotalWDs$ assumes that unique IP addresses are different employees and, thus, is equivalent to the conventional measure of employee work-days.

[5]Appendix A.1 provides details of family-level and fund-level matching. Note that we replicate the main findings of our paper using the fund-level matching (see Appendix A.2) and the results support the findings from the family-level matching. Section 7 includes the one test in the paper that relies on fund-level matching.

2.2 Work Activity and Effort

Total work-days and total requests measure work activity within a mutual fund family, but it is unclear whether they proxy for effort. For example, total work-days may increase because more analysts were recently hired, not because more effort was exerted. Similarly, total requests may increase as a result of either newly hired analysts making requests or an increase in new public filings that analysts make requests to review. In the latter case, effort did not increase, instead work activity shifted toward making requests to process an increased supply of information.

To go beyond our measures of work activity and create a proxy for effort, we focus on weekends and create two new variables: the ratio of weekend work-days to total work-days ($PctWkWDs$), and the ratio of weekend requests to total requests ($PctWkReqs$).[6] Thus constructed, these weekend ratios measure the relative amount of work occurring on weekends and provide a clearer proxy for effort.

With the two ratio variables in hand, the first key questions are whether work activity and effort vary *across* mutual fund families, *within* families, and/or across time? Also, are these measures highly correlated with one another such that either they can be combined or we can rely on only one of them as a representative proxy? To help address these questions, Table 1 provides various summary statistics for work activity and effort.

[Table 1 about here.]

Total work activity varies significantly across mutual fund families. From Panel A of Table 1, mutual fund families average 125 work-days and $4,200$ requests per month, with standard deviations of 252 work-days and $10,181$ requests. Similarly, Panel B (which summarizes activity and effort in the cross section) shows that the average mutual fund family averages 89 work-days and $2,751$ requests per month, with standard deviations of 196 work-

[6]Throughout this paper, references to weekends also include market holidays. However, for clarity of composition, we refer only to weekends. Note that our results are robust to limiting our ratio variables to only weekends while excluding market holidays.

days and $7,492$ requests. In untabulated results, the average standard deviations of total work-days and total requests within families are 27 work-days and $1,081$ requests.

The effort proxies also vary significantly. Across the entire panel, the proportion of work-days coming from weekends averages 10% with a standard deviation of 10%. The proportion of weekend requests averages 5% with a standard deviation of 12%. To contextualize these percentages, note that weekends account for approximately 30% of each year. Thus, average weekend ratios of between 5% and 10% indicate that families do most of their work on regular working days, not on weekends. Further, in untabulated results, the average standard deviations of weekend work-days and weekend requests within families are 6% and 5%, respectively.

Panel C of Table 1 shows the pairwise correlations between our measures of activity and effort. The two total activity variables are highly positively correlated with each other ($\rho = 0.86$). The effort variables are highly correlated with each other as well ($\rho = 0.58$), but are less positively correlated with total activity. Principal component analysis (Panel D) reveals that only two meaningful factors explain 87% of the variation across the four different variables. The first factor loads positively on all four variables, though most heavily on the two total activity measures. In contrast, the second factor loads positively and most heavily on the two effort variables and negatively on total activity. As such, we interpret the first factor as a measure of total activity in general while the second factor measures effort.

These results inform our empirical analysis in three ways. First, we calculate the average of the two weekend ratio variables ($PctWk$) and use this average as our main ratio variable.[7] Second, we consider this average weekend ratio variable as a proxy for effort. Third, to enhance our interpretation of $PctWk$ as a proxy for effort, we control for total work activity using $TotalWDs$ in the tests that follow.

To analyze the time series of effort, we average $PctWk$ across all mutual fund families each month. The resulting time series – shown in Figure 1 and further detailed in Table

[7]Summary statistics for $PctWk$ have been included in Panels A and B of Table 1.

2 – shows considerable temporal variation. Effort also exhibits strong seasonality, with mutual fund families exerting more effort from November though February. Finally, Table 2 and Figure 2 show that effort is mostly unrelated to other time series of interest, including market returns, market volatility, the number of new filings in EDGAR, and the number of earnings announcements among public firms.

[Table 2 about here.]

[Figure 1 about here.]

[Figure 2 about here.]

3 Data

This study relies on three primary data sources: the EDGAR Log Files, the Center for Research in Security Prices (CRSP Mutual Funds) Survivorship Bias-Free Mutual Funds Database, and the Thomson Reuters mutual fund holdings database. The EDGAR data provides our measures of activity and effort.[8] Combining CRSP Mutual Funds and Thomson Reuters, we obtain mutual fund and mutual fund family level data, including: total net assets under management, expenses, turnover, active share, fund flows, fund returns, and other fund and family characteristics. We also utilize family-level measures of managerial incentives (competitive and cooperative) as in Evans et al. (2020), and use analyst forecast data from the Institutional Brokers' Estimate System (IBES) to characterize fund portfolios. The variables and data sources used in this study are detailed in Appendix A.1.2.

Our sample includes 90 months – from January 2010 through June 2017 – and 115 mutual fund families. We measure effort at the family level, but, since many of our variables are fund-level measures, we use a fund-by-month panel of approximately $40,000$ observations with non-missing data.

[8]The EDGAR Log Files database is detailed in Section 2.1 and Appendix A.1.1.

As discussed in Section 2.1, matching IP addresses to mutual fund families relies on IP address registration records. Many mutual fund families, however, are not observable in the registration records, likely because they have not registered a large block of IP addresses. As a result, of the 614 families we collect from the CRSP Mutual Funds database, we measure effort for 115 of them. Given that our sample is biased toward larger families, however, our data cover a large percentage of total funds (48%) and total net assets under management (67%) when compared to the universe of families. Further, the funds in our sample have similar characteristics, in terms of categories and performance, as the larger universe of funds. For more detailed summary statistics on our sample, and its comparison with the universe from CRSP Mutual Funds, see Table 3.

[Table 3 about here.]

4 The Determinants of Effort

Given effort varies across and within mutual fund families, we analyze the determinants of effort. Do families with expensive funds exert more effort than families with relatively inexpensive funds? Do families with more concentrated portfolios work harder than families with less concentrated portfolios? Do recent performance and recent flows affect effort?

We model the determinants of effort as the follows:

$$PctWk_{it} = \alpha + \gamma TotalWDs_{it} + \beta X_{ijt} + \epsilon_{ijt}, \tag{1}$$

where the subscripts represent family i with mutual fund j in month t. The vector of independent variables, X, includes fund-level covariates such as: $TNAM$, *Expenses*, *Analysts*, *Disagreement*, HHI, *Turnover*, *ActiveShare*, *PctNetFlow*, *Alpha*, and *Volatility*. Family-level measures of incentives, *Competitive* and *Incentives*, are also included in X. While most of the covariates are measured contemporaneously with $PctWk$, the three variables related to performance are lagged. *PctNetFlow* measures aggregate fund flows over the last year. *Alpha* measures compound benchmark adjusted returns over the last six months. And $Volatility$ measures the standard deviation of monthly benchmark adjusted returns over the last six months. Standard errors are clustered by family-month.

We estimate this model over three subsamples. The first includes every observation with non-missing data while the second and third subsamples exclude families with scant EDGAR activity. As a whole, our sample includes many observations where $PctWk = 0$.[9] The prevalence of these *no effort* observations may be accurate, though some may result from mismeasurement because either we erred in unmasking IP addresses for some families or some families generally do not use EDGAR. In either case, we account for this by dropping observations where $PctWk = 0$ or by excluding families if their median total weekend work-days across our sample period is less than 1.

Table 4 reports the results from estimating Equation 1 on our three subsamples and with two different fixed-effect specifications. The first specification uses investing style and year-month fixed effects. The coefficient estimates from this model may be interpreted as *across family* effects. For instance, Columns 2 through 4 show that size ($TNAM$) is positive and statistically significant, indicating that families with bigger mutual funds exert more effort than families with smaller mutual funds. As another example, families with more expensive funds work harder than families with less expensive funds. This particular result should comfort mutual fund investors since it shows that managers who charge more for their services are working harder to earn those high fees.

[Table 4 about here.]

With regards to portfolio construction, high effort families hold less concentrated portfolios, hold stocks with more disagreement among analysts, and hold stocks followed by more analysts. In terms of investment and trading behavior, harder working families have higher turnover and lower active share.

[9] Approximately 15% of our observations have $PctWk = 0$.

When it comes to the incentives faced by investment managers – cooperative versus competitive incentives – families with relatively more competitive incentives exert more effort. This confirms common intuition as more incentives to boost alpha spur managers to exert more effort.

The results in Columns 2 through 4 also suggest that harder working families attract more inflows and have lower idiosyncratic volatility. Thus, there are payoffs to working harder, though it is not clear that high effort families generate more alpha than others.

Columns 5 through 7 of Table 4 include a family fixed effect, changing the interpretation of the coefficient estimates to *within family* relations. For example, the estimates for size indicate that as funds within a family grow larger there is no corresponding change in effort. As with size, under this specification many of the covariates that explain effort across families are statistically insignificant with three notable exceptions relating to performance.

The estimates for $PctNetFlow$ are negative and significant, suggesting that within-family outflows inspire more effort. Of course, these negative estimates also suggest that inflows precede less effort. Both interpretations of the negative coefficients may be true, but they tell slightly different stories. To test whether outflows inspire effort or inflows relax effort (or both) we re-estimate Equation 1 but replace the continuous measure of fund flows with indicator variables for high and low. The coefficient estimates for $HighPctNetFlow$ and $LowPctNetFlow$ – shown graphically in Figure 3 – suggest that the effect is driven by outflows. Thus, we interpret our findings as evidence that recent outflows inspire more effort.

[Figure 3 about here.]

Columns 5 through 7 show similar evidence for recent returns and volatility. The negative estimates for $Alpha$ and the positive estimates for $Volatility$ suggest that effort increases after periods of low returns and high volatility. However, the same critique of this interpretation exists as did with fund flows. As such, we re-estimate Equation 1 using high and low indicator variables to replace $Alpha$ and $Volatility$. Figure 3 shows that high volatility drives higher effort, but it is ambiguous whether high or low returns drive the negative relation found in Table 4.

What is unambiguous from Table 4 and Figure 3 is that a variety of factors explain the variation in effort in the cross section while poor recent performance explains variation in effort within families. Together, these findings suggest that effort should influence important outcomes. Otherwise, why exert extra effort after poor performance? Why work harder unless expecting a payoff? Why would high effort families enjoy higher inflows unless effort matters? Guided by these questions, we investigate the outcomes of effort.

5 The Outcomes of Effort

We use the following model to test whether effort influences future outcomes:

$$Y_{ijt} = \alpha + \gamma TotalWDs_{it-k} + \beta PctWk_{it-k} + \delta Z_{ijt-k} + \epsilon_{ijt}, \tag{2}$$

where $k \in \{3, 12\}$, thus testing the relation between effort and outcomes using both a three-month and a one-year lag. The vector of outcomes, Y, includes: HHI, $Analysts$, $Disagreement$, $Turnover$, $ActiveShare$, $PctNetFlow$, and $Volatility$. All three fixed effects – style, year-month, and family – are included in this model and vector Z contains the three performance related variables found to be significant when explaining within-family variation in effort: $PctNetFlow$, $Alpha$, and $Volatility$. Standard errors are clustered by family-month. Table 5 shows the coefficient estimates for effort.

[Table 5 about here.]

The results show statistically significant relations between within-family effort and future portfolio construction: increased effort is related to increased portfolio concentration and holding stocks with higher analyst coverage. More effort also precedes higher active share and lower turnover. In other words, after increasing effort, families also increase the concentrations and active portions of their portfolios while decreasing turnover. Together, these results suggest an association between effort and attempts to enhance investment strategies.

We also test whether these relations are driven by increases or decreases in effort. To do this we follow a similar strategy as in Section 4 by replacing the continuous measure of effort with indicators for high and low effort. The coefficient estimates for $HighPctWk$ and $LowPctWk$ are shown in Figure 4 and reveal a consistent result: high effort precedes higher portfolio concentration and higher active share.

[Figure 4 about here.]

In terms of future performance, the evidence from Table 5 does not suggest a strong relation between effort and future inflows. There is also a lack of strong evidence that effort is related to future idiosyncratic volatility. However, to further study whether effort precedes – or even causes – better future performance we must investigate its effect on returns. Following the insights from this section, we consider future returns as the dependent variable of interest in the next section.[10]

6 Effort and Future Performance

The evidence thus far suggests that higher effort should lead to better performance. Section 4 shows that harder working families perform better in general and that families appear to increase effort in response to poor performance. Section 5 shows a positive relation between effort and outcomes that correlate with better performance (e.g., lower turnover and higher active share), and also a weak relation between effort and two indicators of performance, inflows and idiosyncratic volatility.

[10] In untabulated results we conducted tests of effort and future fund flows similar to the tests in Section 6. Once we control for returns, there is no relation between effort and future flows. This finding supports our assumption that effot is largely unobservable, especially to mutual fund investors.

Economic intuition also suggests a positive link between effort and performance. Foundational models take as given that more effort improves outcomes or at least increases the likelihood of better outcomes. Given the intuition and the body of evidence thus far, effort should be positively related to future returns. Indeed, we may expect that effort *causes* higher future returns.

On the other hand, more effort may not lead to better performance and may even result in lower returns. For one, our proxy for effort may not accurately capture effort, but instead measure *busyness*. If $PctWk$ measures busyness – the notion that employees can do work-like things to look busy without actually doing hard work – we would expect to find $PctWk$ leading to lower returns. Similarly, extra effort on weekends could indicate overworked employees, which overwork could lead to errors in execution and judgment and, ultimately, to lower returns.

Finally, we measure effort by observing a specific mutual fund activity, reviewing public filings in EDGAR. Reviewing more filings, even on the weekends, may be counterproductive as the information being reviewed is *public* information. More effort acquiring public information could come at the expense of effort to acquire *private* (and perhaps more valuable) information.

To test whether effort leads to better or worse performance, we model future returns as follows:

$$Alpha_{ijt+k,t+k+6} = \alpha + \gamma TotalWDs_{it} + \beta PctWk_{it} + \delta V_{ijt} + \epsilon_{ijt}, \tag{3}$$

where vector V includes $PctNetFlow$, $TNAM$, *Expenses Turnover*, *ActiveShare*, *Competitive*, and $Incentives$. We estimate the model using two different fixed-effect specifications. The first specification uses investing style and year-month fixed effects while the second includes style, year-month, and family fixed effects. Standard errors are clustered by family-month.

To allow time for effort to have an impact, we compound benchmark adjusted returns over the six months from $t + k$ to $t + k + 6$. We then test effort in month t against returns earned beginning in month $t + k$ for $k \in \{1, 6, 12\}$. In other words, we test whether effort leads to higher returns almost immediately ($k = 1$), after a period of six months ($k = 6$), and after a year ($k = 12$). Table 6 shows the results.

[Table 6 about here.]

The first specification – with style and year-month fixed effects – shows that effort precedes higher future returns and that this effect grows over time. When $k = 1$ (over the first six months after exerting effort in month t) returns to effort are rather small. The point estimate of 0.90 suggests that doubling effort leads to a 90 basis point increase in alpha over the next six months. The effect triples, however, when we consider returns further in the future. The point estimate of 3.03 means that doubling effort now increases future returns during the first six months of next year by 303 basis points.

Since these results do not include a family fixed effect, at best they suggest that harder working families generate higher returns in the future. To more clearly test whether effort leads to future returns, we add a family fixed effect and focus on the results in Columns 5 through 7.

Columns 5 and 6 show the effect of effort in month t over the first six months after month t ($Alpha_{1-6}$) and over the following six months ($Alpha_{7-12}$). Across all three panels of Table 6, these columns show either no relation between effort and future returns or a negative relation. This can imply that effort is either useless or counterproductive. However, these estimates may also result from the delayed response of returns to effort and other portfolio changes. Further, Section 4 showed that effort increases after poor performance. If it takes time for effort to reverse poor performance, we would expect negative estimates in the months immediately following month t.

Focusing on returns further in the future, as in Column 7, shows a positive and significant return to effort. The estimate of 2.05 in Panel A suggests that doubling effort at the beginning of this year leads to a 205 basis points increase over the first six months of next year.

Similarly, Panels B and C suggest that doubling effort boosts future returns by approximately 170 basis points.

This evidence rejects the hypotheses suggesting effort is counterproductive or just a measure of busyness and instead supports the hypothesis that effort leads to higher future returns.

6.1 Heterogeneity of the Effort and Performance Relation

The tests in Table 6 use either the full sample of non-missing data or the two subsamples that exclude minimally active families. Though we include a host of control variables (V), our estimates for the effect of effort nonetheless capture the average effect across mutual fund families. But some families may see a higher return to effort than others. In this section, we use subsamples of our data to test whether certain characteristics correspond to a stronger effort-return relation.

We do this by re-estimating Equation 3 after dividing our sample into groups. In our first series of tests, we group mutual funds into high and low subsamples based on relative rankings across various characteristics. For example, we classify each mutual fund as either high or low according to size if $TNAM$ for that mutual fund is above or below the median in a given month. We then compare the estimates from Equation 3 between the high size mutual funds and the low size mutual funds. Given the previous results, we focus on $k = 12$ and include the family fixed effect. Finally, in addition to $TNAM$, we divide the data into high and low subsamples using nine other characteristics that may influence a mutual fund's effort-return relation, including: *Expenses*, *Competitive*, *Analysts*, *Disagreement*, HHI, *Turnover*, *ActiveShare*, *PctNetFlow*, and *Volatility.* Panel A of Table 7 tabulates the results from this series of tests while Figure 5 compares the point estimates graphically.

[Table 7 about here.]

[Figure 5 about here.]

The results clearly show that some mutual funds see a strong return to effort while others experience no benefit from effort. Smaller, more expensive, and more competitive mutual funds see a strong return to effort: doubling effort yields between 292 and 348 basis points for these types of funds. Funds that hold more concentrated portfolios, have lower turnover, have higher active share, and hold stocks followed by fewer analysts with less disagreement also experience a strong return to effort: doubling effort yields between 214 and 344 basis points for these funds. Finally, funds experiencing recent outflows or increased idiosyncratic volatility also see a positive return to effort.

Many of these characteristics align with current research on mutual fund performance. Better performing funds typically have more competitive incentives, higher active share, lower turnover, and more concentrated portfolios. Further, these results support our previous finding in Section 4 regarding effort as a response to poor performance. There we posit that mutual funds exert more effort after poor performance to boost future returns. Here we find evidence supporting this notion.

In addition to unidimensional subsampling, we conduct similar tests after dividing our sample by two dimensions. For example, we compare the estimates from Equation 3 on a subsample of mutual funds with low turnover *and* low active share with the estimates from a subsample of funds with high turnover *and* high active share. Figure 6 reports the results in four matrices comparing subsamples by *ActiveShare* and $Turnover$, *Competitive* and $Turnover$, *Competitive* and *ActiveShare*, and *Competitive* and $PctNetFlow$. While Table 7 showed that high active share *or* low turnover meant a strong return to effort, Figure 6 shows that funds with the strongest return to effort have both high active share *and* low turnover: doubling effort yields 432 basis points for these funds.

[Figure 6 about here.]

Of similar importance, the level of competitive incentives interacts with turnover, active share, and recent fund flows to boost the returns to effort. For highly competitive funds, doubling effort yields approximately 500 basis points when paired with low turnover or high active share or recent outflows.

Informed by the subsample results, we combine six characteristics into a variable called *E-Score*. *E-Score* counts the number of highs and lows corresponding to better returns to effort. For example, if a fund has low $TNAM$, high *Competitive*, high HHI, low $Turnover$, high *ActiveShare*, and high $Volatility$, the *E-Score* is 6. In contrast, if among these six characteristics a fund has only low $TNAM$ and high *Competitive*, *E-Score* equals 2.

Panel B of Table 7 shows that only mutual funds with *E-Score* > 4 experience returns to effort. For mutual funds with high *E-Score*, doubling effort increases future returns by up to 600 basis points.

Combined with previous results, the evidence presented here rejects the notion that mutual fund effort is unimportant or counterproductive. Instead, the results support the idea that effort leads to higher future performance. This section demonstrated an especially strong effort-performance relation for certain mutual funds, namely those with more competitive incentives and those that manage portfolios with lower turnover and higher active share.

6.2 Robustness of the Effort and Performance Relation

The previous results use benchmark adjusted returns as the proxy for future performance. In this section, we use two alternative proxies for performance to test the robustness of our results. In Table 8 we replicate the previous tests using future abnormal returns adjusted using the four-factor model[11] ($4FM$) as proxies for performance.

[Table 8 about here.]

The results support our main finding – effort leads to better future performance. In terms of FF4 alphas, Panel A of Table 8 shows that more effort leads to increases in Four-Factor alphas, especially after a period of time and for funds with high *E-Score*.[12]

[11] Fama and French (1993) and Carhart (1997)

[12] Appendix A.2 provides further robustness tests by replicating Tables 7 and 8 using the two subsamples from previous tests. That is, excluding mutual fund families with very little activity in EDGAR.

6.3 Effort and Future Performance: Summary

Of the several hypotheses presented at the beginning of Section 6, we can reject the notions that effort is counterproductive, that it is not important, and that our measure proxies for busyness. Instead, the evidence favors the idea that effort leads to better future performance, especially for mutual funds that are more likely to benefit from increased effort.

Though effort *precedes* better performance, we have not established that effort *causes* better performance. Effort is endogenous. Our model may omit variables related to both effort and future performance. Of most consequence, reverse causation may explain our evidence. Indeed, the logic of Pástor et al. (2017) suggests that mutual funds will exert more effort when they see profitable opportunities in the future. As a result, the positive effort-performance relation exists because the likelihood of better performance inspires mutual funds to exert more effort (reverse causation). Together with our findings, this logic suggests that capturing high future returns *requires* increased effort, but effort does not *cause* higher future returns. While effort remains pivotal according to this theory, we need a more careful test to determine whether increased effort actually causes higher future returns. We conduct this more careful test in the next section.

7 Causation: Weather and Exogenous Effort

To test for a causal link from effort to future returns we take an instrumental variables approach where the ideal instrument would explain effort while being unrelated to future performance. To find such an instrument we consider effort as a function of its costs and benefits. For example, holding all else constant, as the costs of effort increase (costs such as energy, overtime pay, and foregone leisure) the level of effort will decrease. Similarly, when the benefits of effort increase (such as better future performance) the level of effort will increase.

Seen this way, any instrument related to the benefits of effort may also be related to future performance and fail the exclusion restriction. Thus, we focus our search on the costs of effort. Can we find a variable the affects the costs of effort?

Yes. The weather affects the costs of effort. Specifically, rainy weather on the weekends changes the opportunity costs of working on the weekends. As a clear example, imagine a busy mutual fund manager living in Manhattan. On one particular weekend the weather in Manhattan is beautiful; it is sunny, warm, and clear and the perfect day to enjoy Central Park or any number of activities with family or friends. Given the high quality of potential leisure, the opportunity cost of working this weekend (exerting effort) is very high. In contrast, imagine the same manager on a rainy weekend. The quality of potential leisure – and the opportunity cost of effort – has decreased. Thus, the busy mutual fund manager is more likely to work on this rainy weekend.

Beyond that thought experiment, academic research supports the notion that weather affects work. In the psychology literature, Lee et al. (2014) finds that bad weather increases productivity by eliminating potential cognitive distractions. A similar finding in financial economics shows that productivity increases among institutional investors after bad weather (Zhang (2022)).

Given this background, weather likely satisfies the relevance condition as an instrument for effort. At the same time, weather is unrelated to the benefits of effort, such as future profitable opportunities. Weather may be related to future performance, but only through its affect on the costs of effort and, thus, the level of effort. As such, as an instrument, weather likely satisfies the exclusion restriction.

We measure weather by city and month. To instrument for effort using weather, our effort measures must correspond to specific cities. However, our family-level effort measure disregards the fact that some families contain funds scattered across different cities. To account for this, we obtain fund-level measures of effort by matching IP addresses to funds (not families) using zip codes.[13] We then re-calculate our measures of work activity and

[13]For full details of this matching process see Appendix A.1.1.

effort ($TotalWDs$ and $PctWk$) at the fund-by-month level and identify fund locations to match with the weather data.[14]

The first stage of our instrumental variables approach estimates the following equation:

$$PctWkF_{ijct} = \alpha + \gamma TotalWDsF_{ijct} + \beta_1 Rain_{ct} + \beta_2 Rain^2_{ct} + \beta_3 Temp_{ct} + \delta V_{ijct} + \epsilon_{ijct}, \quad (4)$$

where vector V includes $PctNetFlow$, $TNAM$, $Expenses\ Turnover$, $ActiveShare$, *Competitive*, and $Incentives$ and the subscript c indicates location (city). The model includes year, calendar month, and fund fixed effects. We rename our work activity and effort variable as $TotalWDsF$ and $PctWkF$ to indicate these measures are at the fund level.

The estimates from the first-stage regression – shown in Column 2 of Table 9 – verify that the relevance criteria holds: *Rain*, *Rain*^{2}, and $Temperature$ all help explain the changing levels of effort within mutual funds. As an interpretation of the results; more rain increases effort, though at a decreasing rate. Figure 7 plots this relation, showing that effort increases for weekends with relatively more rain. A very rainy weekend, however, may decrease effort. This non-linearity coincides with data from the US Bureau of Labor Statistics showing that work absences increase during extreme weather events, such as hurricanes and snowstorms.[15]

[Table 9 about here.]

[Figure 7 about here.]

In the second stage we use the predicted levels of effort from the first stage ($Pct\hat{W}kF$) to explain future performance:

$$Y_{ijct+12,t+18} = \alpha + \gamma TotalWDsF_{ijct} + \beta Pct\hat{W}kF_{ijct} + \delta V_{ijct} + \epsilon_{ijct}, \quad (5)$$

[14]We test whether our main results hold using this new sample of fund-level measures. The results are robust and are found in Table A5 in Appendix A.2.

[15]https://www.bls.gov/opub/ted/2017/work-absences-due-to-bad-weather-from-1994-to-2016.htm.

where Y is either $Alpha$ or $CFFM$ and we include style, year-month, city, and fund fixed effects. Columns (3) through (5) of Table 9 report the estimates using all three measures of performance for all non-missing observations. Informed by the results in Section 6.1, Columns (6) through (8) limit the sample to mutual funds with $E - Scores$ of at least four.

Testing across all observations, exogenous effort does lead to higher future four-factor alphas. Given these contrasting results, we cannot conclude that effort causes better future performance. However, approximately half of the mutual funds in this test have $E - Scores$ of three or below. In all our previous tests, funds with low $E - Scores$ did not have a positive relation between effort and future performance.

When focusing on mutual funds with high $E - Scores$ – funds we expect to benefit from effort – the relation between exogenous effort and future performance is positive, statistically significant, and robust across all three measures of performance. From this, we can and do conclude that effort causes better future performance.

8 Conclusion

We develop a novel of mutual fund manager effort and examine its determinants and consequences. Our measure compares observable mutual fund work activity between regular workdays and weekends. We find that effort ($PctWk$) varies over time (there is generally more effort between November and February) and across mutual funds (larger, more expensive, better run funds put in more effort). Further, we find that within-family increases in effort come in response to poor recent performance, outflows and higher volatility.

We carefully study the outcomes of effort and find that after mutual funds increase their effort their portfolios are more concentrated, have higher active share, and experience lower turnover. Not only are their portfolio management changes after effort, but more effort leads to better performance in the future in terms of benchmark adjusted alphas.

To establish a causal link between effort and future performance we instrument for fund-level effort using city-level weather. Using this instrument, our results show that even weather-driven effort leads to higher future performance. Thus, not only is there is positive relation between effort and future performance – a relation that could be the result of reverse causality – but there is a causal link: more effort *causes* higher future performance.

Finally, given both the unique nature of our measure and its relevant relations with many other mutual fund characteristics, we suggest that future researches, practitioners, and mutual fund investors consider mutual fund manager effort.

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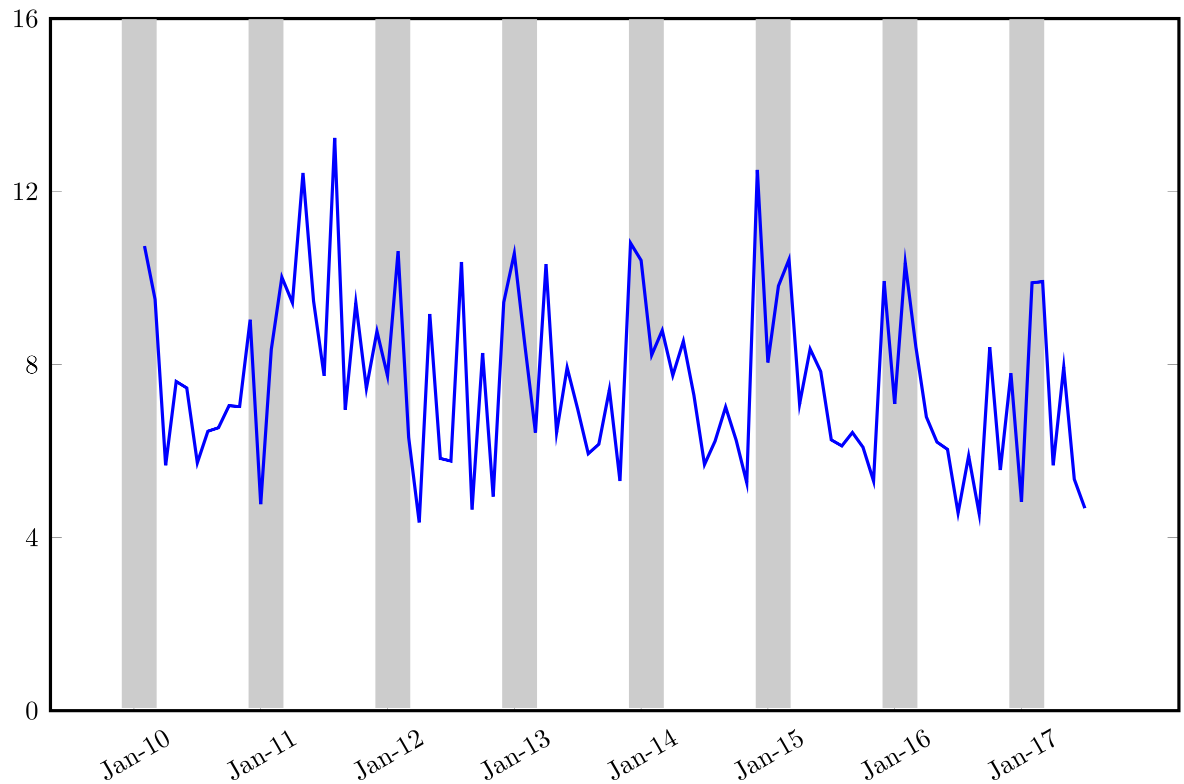
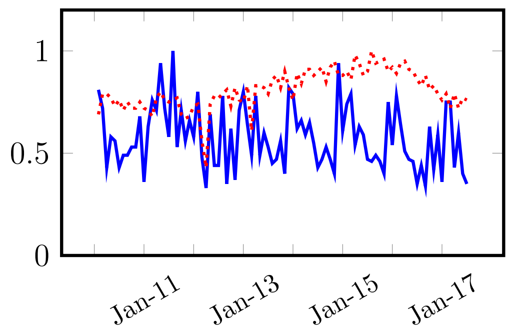
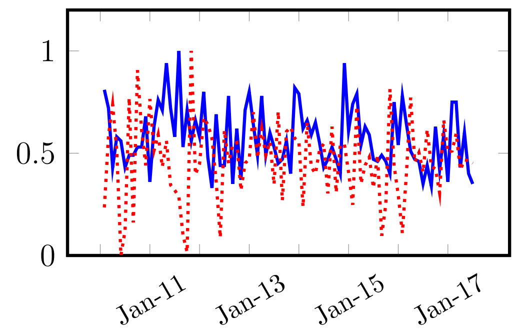


Figure 1: Time Series of Effort

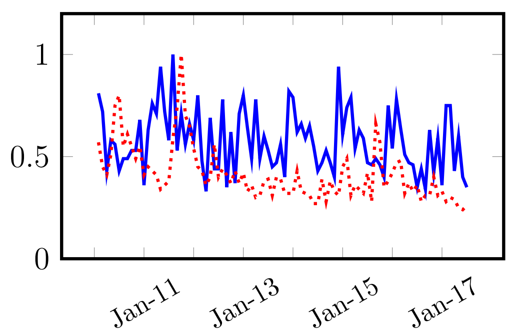
The figure shows the time series of effort, as proxied by $PctWk$. In this time series, $PctWk$ is measured as the mean $PctWk$ across all mutual fund families every month. The vertical axis is in percent.



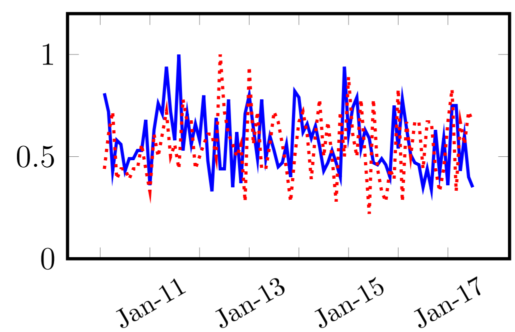
(a) $pctWknd$ and $totalWorkDays$



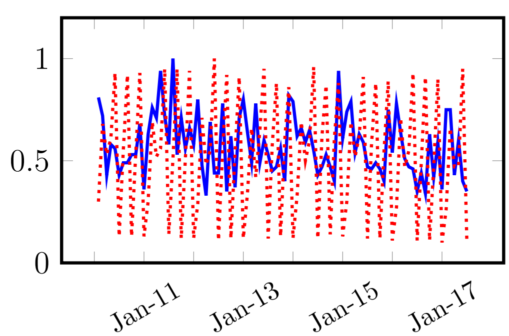
(b) $pctWknd$ and $MktRet$



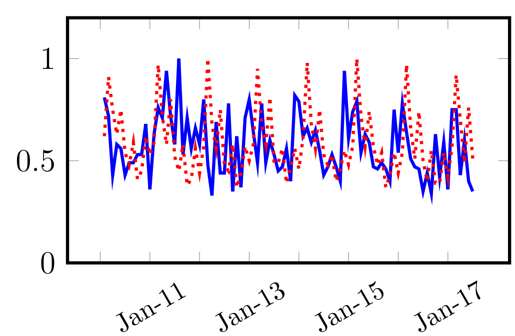
(c) $pctWknd$ and VIX



(d) $pctWknd$ and $nRain$



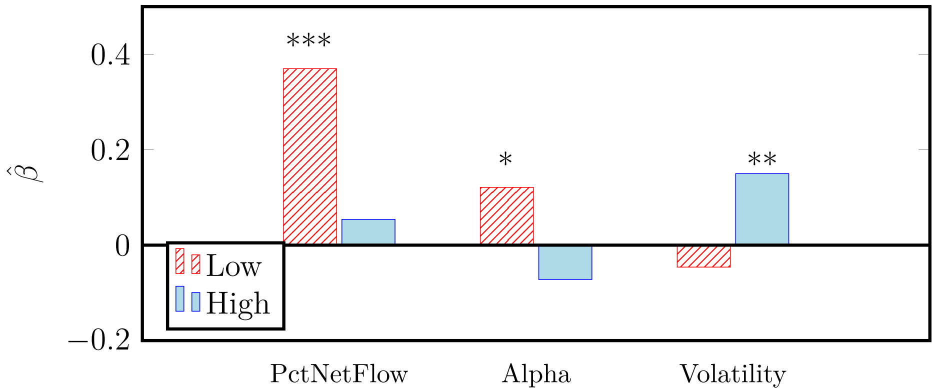
(e) $pctWknd$ and $eadates$



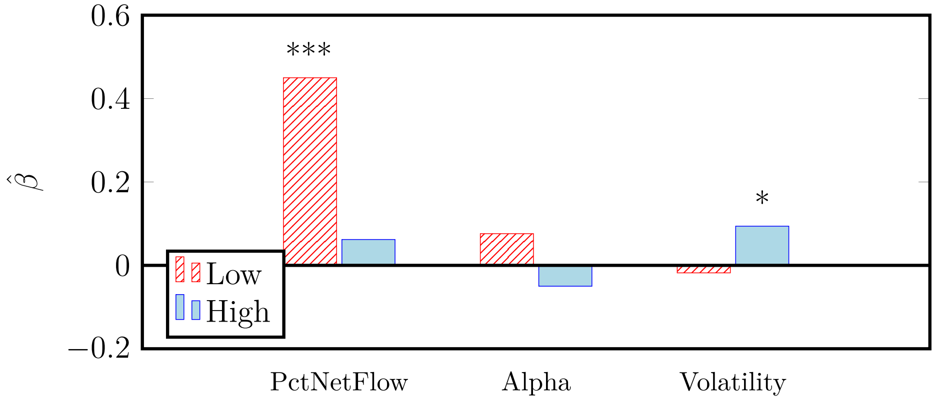
(f) $pctWknd$ and $filings$

Figure 2: Time Series of Effort, Activity, and Other Variables

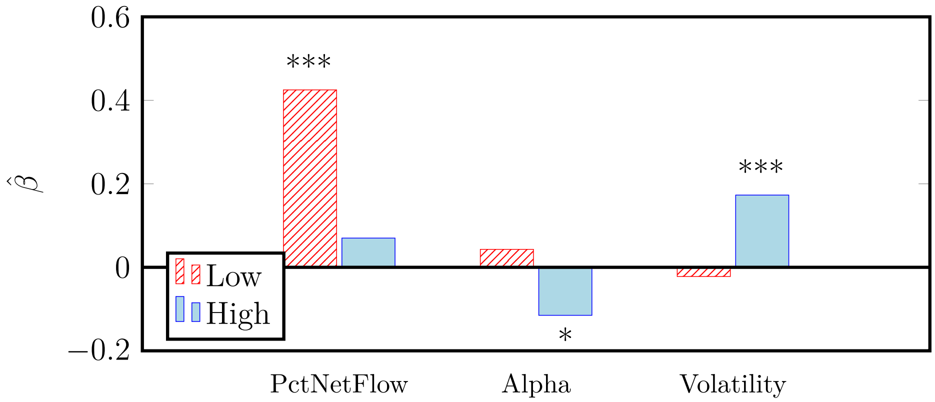
The figure shows the monthly time series of effort ($PctWk$) with other measures, including: activity ($TotalWDs$), market returns ($MktRet$), the market volatility index (VIX), the number of rainy days in New York City ($nRain$), the number of earnings announcements ($EaDates$), and the number of filings registered with EDGAR ($Filings$). Each time series has been scaled as the monthly value divided by its maximum over the 90 months of the series. The series for $MktRet$ has been shifted up each month by the absolute value of the most negative return.



(a) All Observations

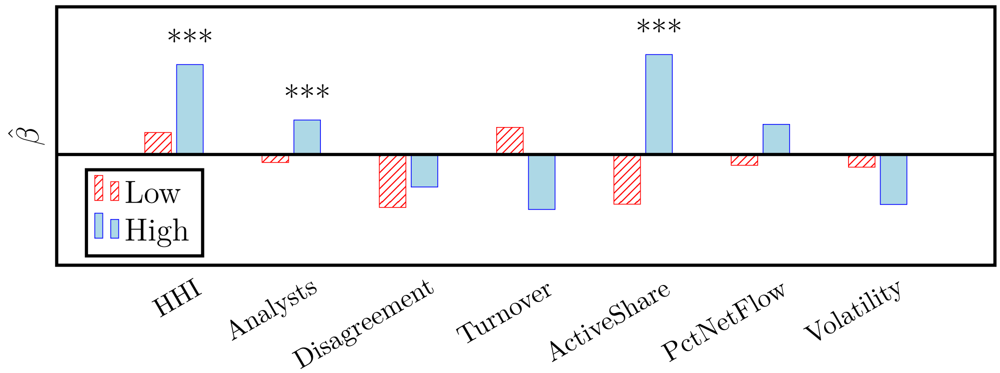


(b) $PctWk > 0$

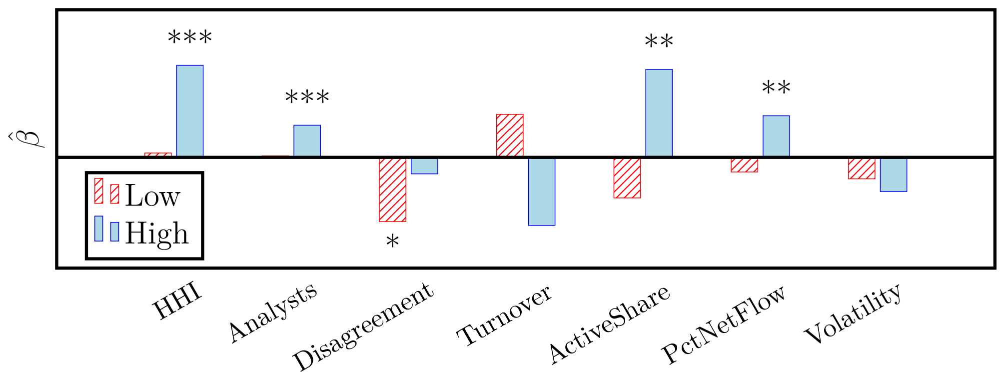


(c) $MedWk > 1$

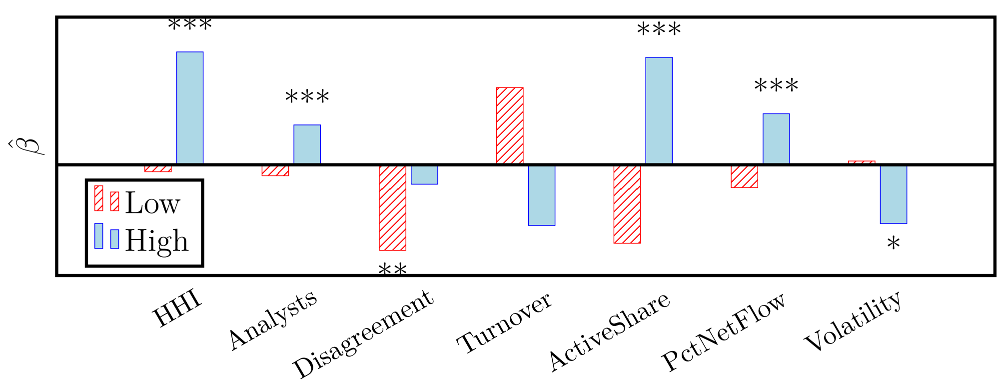
Figure 3: Low versus High Performance and the Determinants of Effort
The figure plots coefficient estimates from estimating Equation 1 using high and low indicators in place of the noted continuous variables. For example, the coefficient estimates for $HighPctNetFlow$ and $LowPctNetFlow$ replace the continuous variable $PctNetFlow$. Panel (a) uses the entire sample while Panels (b) and (c) limit the sample as indicated. Standard errors are clustered by family-month. Indicators ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.



(a) All Observations



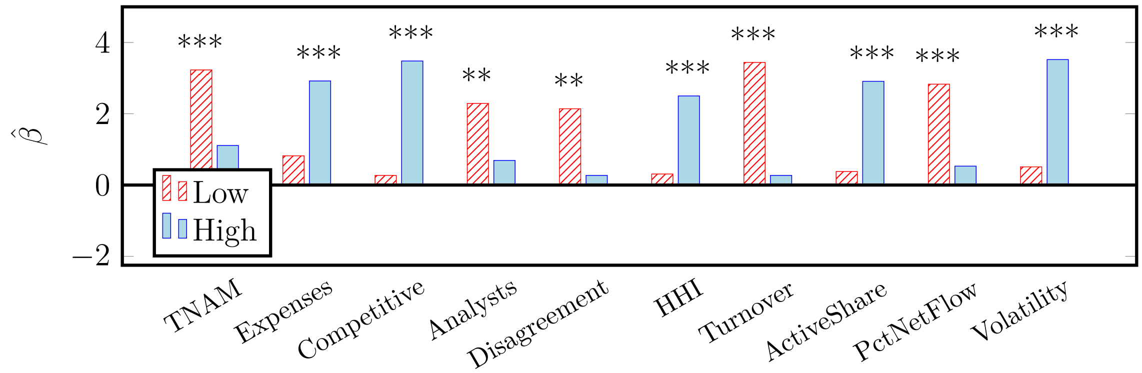
(b) $PctWk > 0$



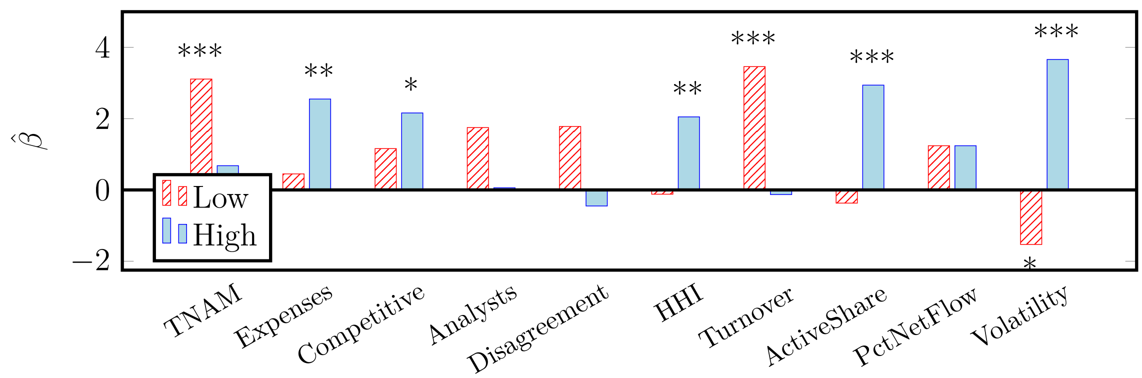
(c) $MedWk > 1$

Figure 4: Low versus High Effort and Outcomes

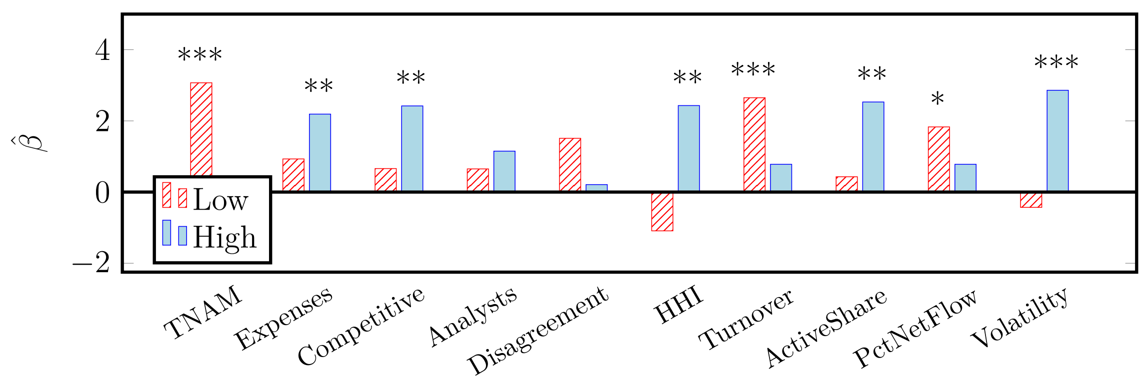
The figure plots coefficient estimates from estimating Equation 2 using high and low indicators in place of the continuous effort variable ($PctWk$). Panel (a) uses the entire sample while Panels (b) and (c) limit the sample as indicated. Standard errors are clustered by family-month. Indicators ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.



(a) All Observations



(b) $PctWk > 0$



(c) $MedWk > 1$

Figure 5: Low versus High Characteristics and the Effort-Return Relation

The figure plots coefficient estimates from estimating Equation 3 using high and low indicators in place of the noted continuous variables. For example, the coefficient estimates for $HighTNAM$ and $LowTNAM$ replace the continuous variable $TNAM$. Panel (a) uses the entire sample while Panels (b) and (c) limit the sample as indicated. Standard errors are clustered by family-month. Indicators ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Turnover \ ActiveShare	Low	High
Low	1.50	4.32***
High	-0.62	0.37

ActiveShare \ Competitive	Low	High
Low	0.32	0.49
High	0.04	5.06***

Turnover \ Competitive	Low	High
Low	0.61	5.56***
High	-0.04	0.68

PctNetFlow \ Competitive	Low	High
Low	0.15	4.91***
High	0.22	0.99

Figure 6: Sensitivity of Future Alpha to $PctWk$: Based on High v. Low

The figure shows the coefficient estimates from Equation 3 after sub-sampling the data in two dimensions. For example, we compare the estimates from Equation 3 from mutual funds with low *Turnover* and low *ActiveShare* with the estimates from funds with high *Turnover* and high *ActiveShare*. Standard errors are clustered by family-month. Indicators ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

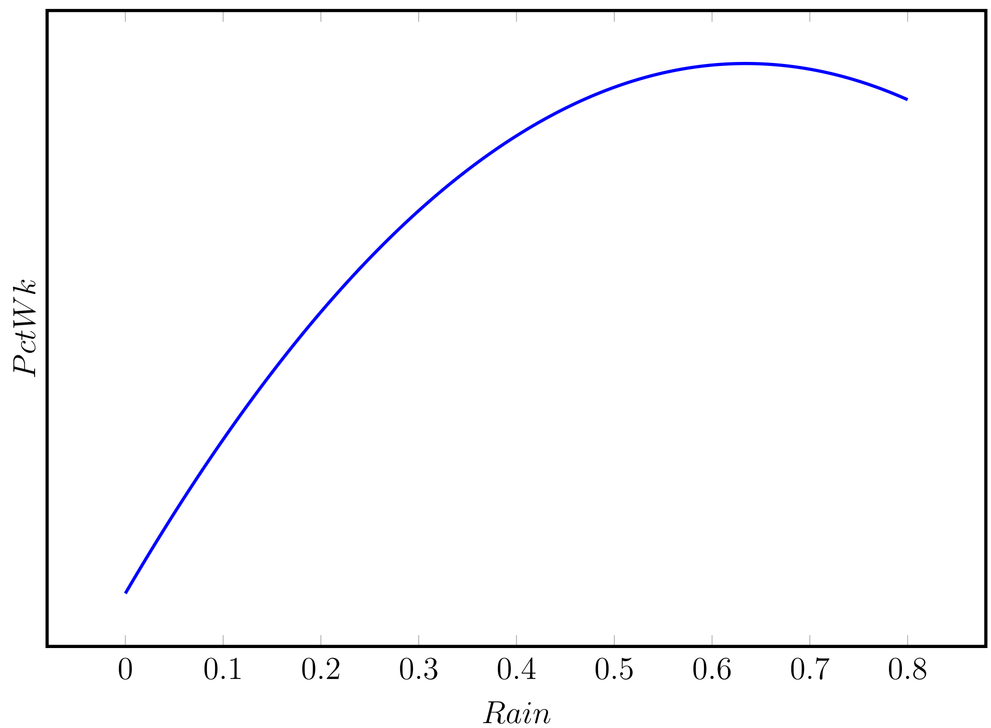


Figure 7: Effort and Rain - 1st Stage

The figure shows relation between $PctWk$ and $Rain$ implied from the first-stage regression estimating Equation 4.

Table 1: Summary Statistics: Activity and Effort

The table provides a summary of the activity and effort measures. The sample consists of 115 mutual fund families across 90 months (from January 2010 through June of 2017). Panel A and Panel B provide summary statistics across the entire panel and in the cross-section, respectively. A correlation matrix among the four activity and effort variables is in Panel C. Panel D shows the factors loadings, eigenvalues, and proportion of explained variation from a principal components analysis.

(1)	(2)	(3)	(4)	(5)	(6)	(7)

Panel A. Summary of the Panel (Family-by-Month Observations)

				Percentile		
Variable	Mean	Std. Dev.	Skewness	25^{th}	50^{th}	75^{th}
TotalWDs	125	252	4.61	21	39	131
PctWkWDs	0.10	0.10	1.43	0.01	0.08	0.16
TotalReqs	4,200	10,181	4.38	205	923	3,546
PctWkReqs	0.05	0.12	4.84	0.00	0.02	0.05
PctWk	0.08	0.10	2.95	0.01	0.05	0.11

Panel B. Summary of the Cross-Section (Family-level Observations)

				Percentile		
Variable	Mean	Std. Dev.	Skewness	25^{th}	50^{th}	75^{th}
TotalWDs	89	196	5.11	18	28	64
PctWkWDs	0.08	0.08	1.40	0.03	0.05	0.11
TotalReqs	2,751	7,492	5.11	134	543	1,782
PctWkReqs	0.04	0.08	5.47	0.01	0.02	0.03
PctWk	0.06	0.07	2.87	0.02	0.04	0.08

Panel C. Correlation Matrix in the Panel

	TotalWDs	TotalReqs	PctWkWDs	PctWkReqs
TotalWDs	1.00	0.86	0.24	0.07
TotalReqs	0.86	1.00	0.34	0.07
PctWkWDs	0.24	0.34	1.00	0.58
PctWkReqs	0.07	0.07	0.58	1.00

Panel D. Principal Component Analysis in the Panel

Variable	Factor 1	Factor 2
TotalWDs	0.84	-0.46
TotalReqs	0.87	-0.42
PctWkWDs	0.67	0.59
PctWkReqs	0.45	0.79
Eigenvalues	2.12	1.36
Proportion of Variation	0.53	0.34

Table 2: Time Series Analysis of Activity and Effort

The table provides a time series analysis of the mean of $TotalWDs$ and $PctWk$ across 90 months (from January 2010 through June of 2017). The table includes correlations of other time series variables in the panel. The other time series variables include: market returns ($MktRet$), the market volatility index (VIX), the number of filings registered with EDGAR ($Filings$), and the number of earnings announcements ($EaDates$).

(1)	(2)	(3)
Panel A. Time Series Analysis		
	ΔTotalWDs$_{t,t-1}$	PctWk$_t$
μ	3.01	0.04
	(5.84)	(0.03)
AR(1)	-0.37***	-0.01
	(0.10)	(0.11)
AR(12)	0.23**	0.45***
	(0.10)	(0.11)
MktRet	-55.27*	-0.04
	(31.16)	(0.06)
VIX	-0.17	0.00
	(0.17)	(0.00)
Filings	0.00	0.00
	(0.00)	(0.00)
EaDates	0.00	0.00
	(0.00)	(0.00)
TotalWDs		0.00
		(0.00)
N	90	90

Panel B. Correlation Matrix in the Panel

	TotalWDs	PctWk
TotalWDs	1.00	0.19***
PctWk	0.19***	1.00
MktRet	-0.01	-0.01
VIX	-0.01	0.03**
Filings	-0.01	0.03**
EaDates	0.00	0.01

Table 3: Summary Statistics: Mutual Fund Families

The table shows summary statistics for the mutual funds and mutual fund families in our sample. Panel A summarizes across the fund-by-month panel. Panel B summarizes across the family-by-month panel after aggregating funds within families. Panel C compares our sample with the universe of mutual funds.

(1)	(2)	(3)	(4)	(5)
Panel A. Summary of Fund-by-Month Observations				
Variable	Mean	Std. Dev.	Median	N
TNAM (*millions*)	3,310	10,300	759	46,573
HHI	1.55	0.73	1.44	39,841
Expenses	1.19	0.33	1.22	46,561
Turnover	71	55	58	46,561
ActiveShare	77	13	79	46,576
Analysts	21	7	23	39,841
Disagreement	25	278	0.29	39,841
PctNetFlow	-0.51	2.39	-0.64	46,570
Alpha	-0.59	2.68	-0.56	41,657
Volatility	0.91	0.45	0.82	41,657
Panel B. Summary of Family-by-Month Observations				
Variable	Mean	Std. Dev.	Median	N
Funds	56	57	40	5,631
TNAM (*millions*)	130,000	319,000	41,000	5,631
HHI	1.75	0.64	1.66	4,927
Expenses	1.13	0.32	1.17	5,632
Turnover	52	31	46	5,632
ActiveShare	77	10	77	5,631
Analysts	22	5	23	4,927
Disagreement	25	178	0.41	4,927
PctNetFlow	0.01	1.11	0.06	5,631
Alpha	-0.78	1.92	-0.71	4,957
Volatility	0.92	0.34	0.87	4,957

Panel C. Comparison of Sample versus Universe of Mutual Funds

Variable	Sample	Universe
No. of Fund Families	115	614
No. of Funds	1,408	2,922
Total Net AUM (*millions*)	$10,818,135	$16,134,532
Mean Family Net AUM (*millions*)	$99,249	$26,891
Pct. Of Large Cap Categories	57%	55%
Mean Alpha	-0.10%	-0.11%
Mean Morningstar Stars	3.41	3.30

Table 4: Determinants of Effort

The table shows the results from estimating Equation 1 to test the relation between effort ($PctWk$) and various mutual fund characteristics. Columns 2 through 4 include style and year-month fixed effects while Columns 5 through 7 add a mutual fund family fixed effect. The table shows estimates across the entire sample as well as when limiting the sample to observations where $PctWk > 0$ or for families with median total weekend work-days greater than one ($MedWk > 1$). Standard errors are clustered by family-month. Indicators ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All Obs.	PctWk > 0	MedWk > 1	All Obs.	PctWk > 0	MedWk > 1
	PctWk	PctWk	PctWk	PctWk	PctWk	PctWk
TotalWDs	2.66***	2.05***	2.33***	1.47***	-0.62*	0.86**
	(0.09)	(0.11)	(0.10)	(0.30)	(0.32)	(0.35)
TNAM	0.15***	0.14***	0.12***	0.00	0.01	0.01
	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)	(0.01)
Expenses	2.46***	2.95***	3.37***	-0.04	0.05	-0.01
	(0.25)	(0.26)	(0.27)	(0.08)	(0.08)	(0.08)
Competitive	10.35***	11.92***	13.76***	0.45	0.99	0.92
	(0.65)	(0.74)	(0.73)	(1.50)	(1.59)	(1.64)
Incentives	3.82***	4.77***	4.90***	0.10	-1.64	-2.01*
	(0.35)	(0.37)	(0.40)	(1.13)	(1.08)	(1.10)
Analysts	0.09***	0.10***	0.07***	0.02***	0.03***	0.04***
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Disagreement	0.01	0.07*	0.07**	-0.02	-0.01	-0.03*
	(0.04)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)
HHI	-0.15	-0.22**	-0.33***	0.07	0.08	0.07
	(0.10)	(0.10)	(0.12)	(0.05)	(0.05)	(0.04)
Turnover	0.13**	0.14**	0.15**	-0.02	-0.03	-0.00
	(0.06)	(0.06)	(0.07)	(0.03)	(0.03)	(0.03)
ActiveShare	-0.04***	-0.03***	-0.04***	-0.00	-0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
PctNetFlow	2.55	3.58*	3.71*	-2.01*	-2.18*	-1.91*
	(1.93)	(2.05)	(2.00)	(1.13)	(1.14)	(1.08)
Alpha	0.03	0.02	-0.01	-0.03**	-0.01	-0.02*
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Volatility	-0.38***	-0.52***	-0.64***	0.14**	0.11*	0.12*
	(0.11)	(0.11)	(0.11)	(0.06)	(0.06)	(0.06)
N	23,937	20,367	18,634	23,937	20,367	18,634
Style-Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund Family FE	No	No	No	Yes	Yes	Yes
R^2	0.39	0.34	0.40	0.71	0.72	0.74

Table 5: Outcomes of Effort

The table shows the results from estimating Equation 2 to test the relation between effort ($PctWk$) and future mutual fund characteristics and outcomes. The independent variables are lagged three months and twelve months, as indicated below. All three fixed effects – style, year-month, and family – are included. Panel A shows estimates when using the entire sample. Panel B limits the sample to observations where $PctWk > 0$. Panel C limits the sample to families with median total weekend work-days greater than one ($MedWk > 1$). Standard errors are clustered by family-month. Indicators ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Panel A: All Observations.														
	HHI		Analysts		Disagreement		Turnover		ActiveShare		PctNetFlow		Volatility	
$PctWk_{t-3}$	0.16**		1.15***		-0.10		-0.29***		0.53		0.00		0.14*	
	(0.07)		(0.26)		(0.10)		(0.10)		(0.88)		(0.00)		(0.08)	
$PctWk_{t-12}$		0.18**		1.06***		0.00		-0.28**		3.76***		0.00		-0.13
		(0.07)		(0.30)		(0.09)		(0.11)		(0.95)		(0.01)		(0.09)
N	23,713	20,865	23,713	20,865	23,713	20,865	25,492	20,990	25,564	21,059	25,564	21,059	24,807	20,478
R^2	0.53	0.53	0.91	0.91	0.09	0.10	0.27	0.27	0.66	0.65	0.83	0.33	0.37	0.37
Panel B: Observations where $PctWk > 0$.														
	HHI		Analysts		Disagreement		Turnover		ActiveShare		PctNetFlow		Volatility	
$PctWk_{t-3}$	0.21***		1.64***		-0.19*		-0.40***		-0.45		0.00		0.14	
	(0.08)		(0.30)		(0.10)		(0.12)		(1.01)		(0.00)		(0.09)	
$PctWk_{t-12}$		0.25***		0.83***		0.09		-0.37***		3.77***		0.01		-0.07
		(0.08)		(0.32)		(0.09)		(0.13)		(1.07)		(0.01)		(0.09)
N	20,276	18,045	20,276	18,045	20,276	18,045	21,671	18,135	21,737	18,198	21,737	18,198	21,208	17,793
R^2	0.53	0.53	0.91	0.91	0.10	0.10	0.25	0.25	0.64	0.63	0.83	0.32	0.37	0.37
Panel C: Observations where $MedWk > 1$.														
	HHI		Analysts		Disagreement		Turnover		ActiveShare		PctNetFlow		Volatility	
$PctWk_{t-3}$	0.30***		1.85***		-0.16		-0.30**		1.30		0.00		0.07	
	(0.08)		(0.30)		(0.11)		(0.13)		(1.11)		(0.00)		(0.09)	
$PctWk_{t-12}$		0.32***		1.30***		0.09		-0.38***		4.77***		0.01***		-0.23**
		(0.08)		(0.32)		(0.11)		(0.14)		(1.24)		(0.01)		(0.09)
N	18,603	16,495	18,603	16,495	18,603	16,495	20,047	16,534	20,119	16,603	20,119	16,603	19,576	16,165
R^2	0.56	0.56	0.91	0.91	0.10	0.11	0.23	0.23	0.64	0.63	0.82	0.32	0.37	0.37

Table 6: Effort and Future Performance

The table shows results from estimating Equation 3 to test the relation between effort ($PctWk$) and future performance ($Alpha$), measured as the compound benchmark adjusted return over six months from $(t+k)$ to $(t+k+6)$ for $k \in \{1, 6, 12\}$. Control variables include: $PctNetFlow$, $TNAM$, $Expenses$ $Turnover$, $ActiveShare$, $Competitive$, and $Incentives$. The model always includes style and year-month fixed effects while a family fixed effect is only included in Columns 5 through 7. Panel A shows estimates when using the entire sample. Panel B and Panel C limit the sample to observations where $PctWk > 0$ and to families with median total weekend work-days greater than one ($MedWk > 1$). Standard errors are clustered by family-month. Indicators ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. All Observations.						
	$Alpha_{1-6}$	$Alpha_{7-12}$	$Alpha_{13-18}$	$Alpha_{1-6}$	$Alpha_{7-12}$	$Alpha_{13-18}$
PctWk	0.90*	1.54***	3.03***	-1.25*	-0.78	2.05***
	(0.47)	(0.46)	(0.47)	(0.68)	(0.61)	(0.69)
TotalWDs	0.14***	0.08***	0.04*	0.16***	-0.04	-0.00
	(0.02)	(0.02)	(0.02)	(0.06)	(0.06)	(0.06)
PctNetFlow	1.63*	-1.13	-1.15	-0.55	-3.29***	-3.22***
	(0.88)	(0.85)	(0.84)	(0.94)	(0.87)	(0.86)
TNAM	-0.06***	-0.05***	-0.02	-0.08***	-0.07***	-0.02*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Expenses	-0.65***	-0.78***	-0.69***	-0.43***	-0.48***	-0.29***
	(0.06)	(0.06)	(0.06)	(0.08)	(0.08)	(0.08)
Turnover	-0.09***	-0.05*	-0.05*	-0.13***	-0.10***	-0.13***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
ActiveShare	-0.01***	-0.01***	-0.02***	-0.00	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Competitive	0.00	-0.28*	-0.43***	0.52	0.13	0.19
	(0.16)	(0.16)	(0.15)	(0.44)	(0.44)	(0.45)
Incentives	-0.21**	-0.22**	-0.24**	0.32	-0.03	0.12
	(0.09)	(0.09)	(0.10)	(0.36)	(0.37)	(0.39)
N	25,259	25,359	25,515	25,257	25,357	25,513
R^2	0.10	0.10	0.10	0.13	0.12	0.12
Panel B. Observations where $PctWk > 0$.						
	$Alpha_{1-6}$	$Alpha_{7-12}$	$Alpha_{13-18}$	$Alpha_{1-6}$	$Alpha_{7-12}$	$Alpha_{13-18}$
PctWk	0.02	0.80	1.92***	-1.00	-1.52**	1.69**
	(0.48)	(0.50)	(0.48)	(0.78)	(0.73)	(0.79)
N	21,139	21,127	21,187	21,137	21,125	21,185
R^2	0.11	0.11	0.11	0.13	0.13	0.13
Panel C. Observations where $MedWk > 1$.						
	$Alpha_{1-6}$	$Alpha_{7-12}$	$Alpha_{13-18}$	$Alpha_{1-6}$	$Alpha_{7-12}$	$Alpha_{13-18}$
PctWk	-0.42	0.74	2.09***	-1.74**	-1.01	1.70**
	(0.49)	(0.49)	(0.48)	(0.77)	(0.77)	(0.73)
N	19,563	19,616	19,677	19,561	19,614	19,675
R^2	0.11	0.11	0.11	0.13	0.12	0.13

Table 7: Effort and Future Performance: Heterogeneous Effects

The table shows results from estimating Equation 3 to test the relation between effort ($PctWk_1$) and future performance ($Alpha_{13-18}$). In Panel A, the sample is split between high and low groups, subject to the specified criteria. For example, Columns 2 and 3 estimate the the model after splitting the sample between low $TNAM$ mutual funds and high $TNAM$ mutual funds. In Panel B, six characteristics are combined into a variable called $E - Score$ which counts the number of highs and lows corresponding to better returns to effort. Control variables include: $PctNetFlow$, $TNAM$, $Expenses$ $Turnover$, $ActiveShare$, $Competitive$, and $Incentives$. The model always includes style, year-month, and family fixed effects and standard errors are clustered by family-month. Indicators ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel A: Low v. High Based on Mutual Fund Characteristics										
	TNAM		Expenses		Competitive		Analysts		Disagreement	
	Low	High	Low	High	Low	High	Low	High	Low	High
	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha
PctWk	3.23***	1.11	0.82	2.92***	0.27	3.48***	2.29**	0.69	2.14**	0.27
	(0.98)	(0.82)	(0.79)	(0.92)	(0.84)	(1.09)	(1.16)	(0.79)	(0.99)	(0.85)
N	11,306	14,207	11,369	14,142	12,262	13,250	10,513	10,824	12,879	8,459
R^2	0.13	0.14	0.14	0.13	0.14	0.12	0.12	0.23	0.15	0.15
	HHI		Turnover		ActiveShare		PctNetFlow		Volatility	
	Low	High	Low	High	Low	High	Low	High	Low	High
	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha
PctWk	0.31	2.50***	3.44***	0.27	0.38	2.91***	2.83***	0.53	-0.51	3.52***
	(1.14)	(0.85)	(0.98)	(0.85)	(0.73)	(0.95)	(0.93)	(0.78)	(0.73)	(0.95)
N	8,819	12,518	13,319	12,216	11,290	14,222	13,512	12,001	10,320	14,932
R^2	0.12	0.18	0.13	0.16	0.20	0.11	0.14	0.15	0.15	0.14

Panel B: Sample Split by E-Score.

	E-Score ≤ 2	E-Score = 3	E-Score = 4	E-Score ≥ 5
	Alpha	Alpha	Alpha	Alpha
PctWk	-1.19	-0.44	3.51***	6.06***
	(0.91)	(0.97)	(1.35)	(1.23)
N	6,337	6,203	5,182	7,785
R^2	0.20	0.17	0.13	0.12

Table 8: Effort and Future Performance – Factor Model Alphas

The table shows results from estimating Equation 3 to test the relation between effort ($PctWk_1$) and future performance measured using factor-model alphas over six months from ($t+13$) to ($t+18$). The table includes alphas from the one-factor ($CAPM$), three-factor ($FF3$), and four-factor ($FF4$) models. Control variables include: $PctNetFlow$, $TNAM$, $Expenses\ Turnover$, $ActiveShare$, $Competitive$, and $Incentives$. Panel A shows estimates when using the entire sample. Panel B uses $E-Score$, which counts the number of highs and lows corresponding to better returns to effort. The model always includes style and year-month fixed effects while a family fixed effect is only included in Columns 5 through 7. Standard errors are clustered by family-month. Indicators ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A. All Observations.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
	CAPM	FF3	FF4	CAPM	FF3	FF4
PctWk	0.54***	0.64***	0.62***	0.18	0.32***	0.33***
	(0.09)	(0.08)	(0.08)	(0.14)	(0.11)	(0.11)
TotalWDs	0.01	0.00	0.00	-0.00	-0.01	-0.02*
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
PctNetFlow	0.37**	0.50***	0.32*	-0.02	0.17	0.04
	(0.19)	(0.17)	(0.17)	(0.20)	(0.18)	(0.18)
TNAM	-0.01**	-0.01***	-0.01***	-0.00	-0.01**	-0.01**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Expenses	-0.13***	-0.13***	-0.11***	-0.13***	-0.10***	-0.09***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Turnover	-0.05***	-0.04***	-0.05***	-0.06***	-0.05***	-0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
ActiveShare	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Competitive	-0.10***	-0.08***	-0.04	0.06	0.05	0.01
	(0.03)	(0.03)	(0.03)	(0.09)	(0.08)	(0.08)
Incentives	-0.08***	-0.07***	-0.05***	-0.06	-0.07	-0.07
	(0.02)	(0.02)	(0.02)	(0.07)	(0.07)	(0.07)
N	21,557	21,557	21,557	21,555	21,555	21,555
R^2	0.20	0.09	0.09	0.22	0.12	0.12

Panel B: Sample Split by E-Score.

	CAPM		FF3		FF4	
	E-Score < 4	E-Score ≥ 4	E-Score < 4	E-Score ≥ 4	E-Score < 4	E-Score ≥ 4
PctWk	-0.24	0.53***	-0.15	0.72***	-0.15	0.76***
	(0.16)	(0.20)	(0.13)	(0.16)	(0.13)	(0.15)
N	10,065	11,489	10,065	11,489	10,065	11,489
R^2	0.22	0.24	0.13	0.14	0.13	0.13

Table 9: Effort and Future Performance: Instrumental Variable

The table uses an instrumental variables approach to test whether effort affects future performance. Four future performance variables are used: $Alpha_{13-18}$, $CAPM_{13-18}$, $FF3_{13-18}$, and $FF4_{13-18}$. Column 2 reports the results from the first stage regression, estimating Equation 4. Columns 3 through 10 report the second stage results, estimating Equation 5. In Columns 7 through 10, the sample is limited to mutual fund families with $E-Score \geq 4$. Fixed effects include yearmonth, style, and month and standard errors are clustered by yearmonth-family and cityh. Indicators ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	First Stage	Second Stage							
	All Obs.	All Observations.				E-Score ≥ 4			
	PctWkF	Alpha	FF1	FF3	FF4	Alpha	FF1	FF3	FF4
$Pct\hat{W}kF$		8.98	2.61	0.15	2.10	56.94***	16.79***	13.12***	18.41***
		(12.90)	(2.58)	(2.47)	(3.61)	(15.63)	(2.68)	(3.08)	(3.04)
Rain	0.03**								
	(0.01)								
$Rain^2$	-0.03								
	(0.02)								
Temperature	0.01								
	(0.01)								
TotalWDsF	0.01	-0.09	-0.03	0.01	-0.02	-0.51*	-0.15***	-0.12***	-0.18***
	(0.01)	(0.17)	(0.03)	(0.02)	(0.04)	(0.29)	(0.04)	(0.03)	(0.04)
PctNetFlow	0.03*	-7.44**	-0.69	-0.27	-0.65	-10.65*	-1.89**	-1.12	-1.31
	(0.02)	(2.78)	(0.43)	(0.56)	(0.69)	(5.59)	(0.75)	(0.96)	(1.10)
TNAM	-0.00	-0.07*	-0.01	-0.02	-0.02	-0.06	-0.02	-0.02	-0.02
	(0.00)	(0.03)	(0.01)	(0.01)	(0.01)	(0.08)	(0.02)	(0.01)	(0.01)
Expenses	-0.00	-0.52***	-0.16**	-0.13***	-0.17***	-0.57**	-0.17**	-0.15**	-0.15**
	(0.00)	(0.17)	(0.07)	(0.04)	(0.06)	(0.23)	(0.08)	(0.05)	(0.06)
Turnover	-0.00	-0.09	-0.05**	-0.04	-0.04	-0.03	-0.04	-0.04	-0.04
	(0.00)	(0.11)	(0.02)	(0.03)	(0.03)	(0.17)	(0.04)	(0.03)	(0.04)
ActiveShare	0.00	-0.01	-0.00	-0.00	-0.00	-0.04***	-0.01*	-0.00	-0.00
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)
Competitive	-0.09***	1.57	0.48	0.09	0.45	7.61**	1.88***	1.50***	2.11***
	(0.02)	(1.91)	(0.32)	(0.41)	(0.44)	(3.04)	(0.38)	(0.53)	(0.40)
Incentives	0.04	-0.61	-0.17	-0.01	-0.41	-1.53	-0.41	-0.36	-1.05***
	(0.03)	(1.08)	(0.20)	(0.22)	(0.28)	(1.46)	(0.30)	(0.28)	(0.31)
N	12,349	11,962	11,859	11,859	9,692	5,764	5,670	5,670	4,841
R^2	0.77	0.15	0.18	0.12	0.12	0.15	0.21	0.17	0.16

Appendix

This appendix provides additional details and empirical evidence to supplement the main text. There are two primary sections of this appendix. Appendix A.1 contains details about the EDGAR Log Files and the process of unmasking mutual fund IP addresses (see Appendix A.1.1) as well as a table detailing the variables used in the paper (see Appendix A.1.2). Appendix A.2 contains various tables that extend the main results from the body of the paper.

A.1 Data Appendix

A.1.1 Unmasking IP Addresses in the EDGAR Log Files

The EDGAR Log Files contain billions of observations of "requests" or "requests to view a filing." Each observation details the filing requested (accession number), the date and time of the request, and the requester (the IP address making the electronic request). A snapshot of the raw EDGAR Log Files is shown below:

IP Address	Date	Time	CIK	Accession Number
38.97.91.ecg	20170531	09:47:33	051143	000104746917001061
38.65.241.fhf	20170531	11:07:28	274191	000002741917000008
67.199.249.igg	20170924	12:27:02	320193	000032019317000009
216.223.41.aah	20170924	16:12:55	831259	000083125917000016

Given our focus in this paper on the requester, linking the masked IP addresses to identifiable investors (e.g., mutual fund families) is pivotal to our study. To unmask the IP addresses, we first notice the fourth octet in the examples above.[1] In place of the actual digits of the requesting IP address, the fourth octet is reported as a set of three letters. However, organizations typically register blocks of IP addresses, with the most common block fixing

[1]For IP addresses, an *octet* is a group of eight bits, or the one to three digit numbers (from 0 to 255) separated by periods in the examples above.

the first three octets and containing all 256 versions of the fourth octet.[2] In other words, only the first three octets are necessary to identify the organization that has registered that block of IP addresses.

Using this insight, we searched historical IP address registration records from 2010 through 2017 to identify the blocks of IP addresses registered to investment firms.[3] Then, using this hand-collected mapping between investment firms and IP addresses, we unmask the requesters in the EDGAR Log Files. As a result, the snapshot of raw data from above has been transformed into the following.

Investment Firm	Date	Time	Ticker	Filing
Abrams Capital	20170531	09:47:33	IBM	10-K for 2016
Harbor Capital	20170531	11:07:28	TGT	10-K for 2016
Crabel Capital	20170924	12:27:02	AAPL	10-Q for Q2 2017
Ronin Capital	20170924	16:12:55	FCX	Earnings for Q2 2017

Furthermore, the three letters used to mask the fourth octet is static, not dynamic. This means, for example, that def replaces the digits 146 for every instance of 146. This allows us to identify unique IP addresses. In other words, though an unmasked mutual fund may make 50 requests one day, we can observe how many different IP addresses made those requests. This insight is particularly important as it allows us to calculate $TotalWDs$.

Finally, we have adjusted the data to remove likely bots. As mentioned, the raw EDGAR Log Files contain billions of requests with many thousands of requests per day coming from single IP addresses. It is unlikely that these thousands of requests per day represent a human actually clicking on documents in EDGAR. It is much more likely that they represent computer programs (bots) downloading large quantities of data at a time. Given these IP addresses do not fit with the spirit of our research, we remove them from the data. The

[2]For example, all 256 IP addresses beginning with 38.97.91 will be registered to the same organization.
[3]IP registration records were acquired from MaxMind, https://www.maxmind.com/en/home.

removal process is as follows: we remove IP addresses that either (i) make over $1,000$ requests in a day or (ii) make requests for over 100 different CIKs (i.e., firms).

A.1.2 Variable Details

Variable	Description
Activity and Effort Variables	Measured at family-month level, except for MedWk, which is at the family level.
TotalWD	The sum of unique, daily IP addresses making requests for a given family over a month. This variable is similar to the idea of employee work-days, which counts how many working days were accomplished by employees over a span of time. TotalWD is winsorized at the 95^{th} percentile and is scaled by the natural log of TotalWD plus one.
TotalReq	The total number of requests made by the IP addresses of a given family over a month. TotalReq is winsorized at the 95^{th} percentile and is scaled by the natural log of TotalReq plus one.
PctWkWD	The ratio of TotalWD from only weekends and market holidays to TotalWD from all days of the month.
PctWkReq	The ratio of TotalReq from only weekends and market holidays to TotalReq from all days of the month.
PctWk	The average of PctWkWD and PctWkReq.
MedWk	The median number of TotalWD from weekends and market holidays for a given family across all months of the sample.
Fund Variables	Measured at the fund-month level.
TNAM	Total net assets under management. Scaled by taking the natural log.
HHI	Herfindahl-Hirschman Index to measure portfolio concentration. Calculated as the sum of the squared portfolio share of each holding within a portfolio. Winsorized at the 99^{th} percentile and divided by 100 for interpretability.
Expenses	Total annual expenses and fees divided by year-end TNA. Winsorized at the 99^{th} percentile.
Turnover	Minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year. Winsorized at the 99^{th} percentile and scaled using the natural logarithm.
ActiveShare	
Analysts	Measures the number of analysts that follow the typical holdings of a fund. Calculated as the value-weighted average (using TNA) of the number of analysts following the stocks in the fund's portfolio.
Disagreement	Measures the disagreement among the analysts that follow the typical holdings of a fund. Calculated as the value-weighted average (using TNA) of the standard deviation of analyst expectations for the stocks in the fund's portfolio.
PctNetFlow	The net growth in fund assets beyond reinvested dividends (Sirri and Tufano (1998)) over the past one year. Winsorized at the 1^{st} and 99^{th} percentiles.
Alpha	Measures the benchmark-adjusted return for a given fund compounded over a six-month period.
Volatility	Measures the standard deviation of month benchmark-adjusted returns over a six-month period.
E-Score	Count of the number of high indicators and low indicators corresponding to better returns to effort. For example, if a fund has low $TNAM$, high $Competitive$, high HHI, low $Turnover$, high $ActiveShare$, and high $Volatility$, the E-Score is 6. In contrast, if among these six characteristics a fund has only low $TNAM$ and high $Competitive$, E-Score equals 2.
CAPM	Measures the risk-adjusted return for a given fund over a six-month period. The CAPM is used for the risk adjustment using the market return as the only factor.
FF3	Measures the risk-adjusted return for a given fund over a six-month period. The Fama-French three factor model (Fama and French (1993)) is used for the risk adjustment.
FF4	Measures the risk-adjusted return for a given fund over a six-month period. The Fama-French three factor model (Fama and French (1993)) plus the momentum factor (Carhart (1997)) is used for the risk adjustment.

Family Variables	
Competitive	Measures the degree to which a family has competitive versus cooperative incentives. The measure is the difference between the a standardized index that measures the fund family competitive incentives and a standardized index that measures the fund family cooperative incentives. See Evans et al. (2020) for details on the standardized index.
Incentives	Measures the incentives faced by managers in a fund family. The measure is the sum of a standardized index that measures the fund family competitive incentives and a standardized index that measures the fund family cooperative incentives. See Evans et al. (2020) for details on the standardized index.

Macro Variables	
MkRet	The monthly return on the market, from Kenneth French's database.
VIX	The end-of-month level of the volatility index, VIX.
Filings	The total number of new filings filed with the SEC via EDGAR in a given month.
EaDates	The total number of public firms releasing quarterly or annual earnings in a given month.

City Variables	
Rain	Measured as the ratio of the number of rainy days on weekends or market holidays in a month for a given city and the number of total rainy days in that month. A rainy day is defined as a day where there was some rain.
Temperature	Measured as the ratio of the median high temperature on weekends or market holidays in a month for a given city and the median high temperature on weekdays in that month.

A.2 Additional Tables

In this appendix, we replicate several tables from the main analysis on different subsamples of the data. Specifically, we replicate Table 7 on the subsamples where $PctWk > 0$ and $MedWk \geq 1$ (Table A1 and Table A2), and we replicate Table 8 using the same subsample criteria (Table A3 and Table A4). Also, we repliate Table 6 using fund-month levels of information acquistion (Table A5).

[Table A1 about here.]

[Table A2 about here.]

[Table A3 about here.]

[Table A4 about here.]

[Table A5 about here.]

Table A1: Effort and Future Performance: Heterogenous Effects, PctWk > 0

The table shows results from estimating Equation 3 to test the relation between effort ($PctWk_1$) and future performance ($Alpha_{13-18}$), while excluding observations unless $PctWk > 0$. In Panel A, the sample is split between high and low groups, subject to the specified criteria. For example, Columns 2 and 3 estimate the the model after splitting the sample between low $TNAM$ mutual funds and high $TNAM$ mutual funds. In Panel B, six characteristics are combined into a variable called $E - Score$ which counts the number of highs and lows corresponding to better returns to effort. Control variables include: $PctNetFlow$, $TNAM$, $Expenses$ $Turnover$, $ActiveShare$, $Competitive$, and $Incentives$. The model always includes style, year-month, and family fixed effects and standard errors are clustered by family-month. Indicators ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Low v. High Based on Mutual Fund Characteristics

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	TNAM		Expenses		Competitive		Analysts		Disagreement	
	Low	High	Low	High	Low	High	Low	High	Low	High
	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha
PctWk	3.11***	0.68	0.45	2.55**	1.16	2.16*	1.75	0.06	1.78	-0.45
	(1.20)	(0.95)	(0.94)	(1.06)	(0.95)	(1.26)	(1.28)	(0.98)	(1.09)	(1.01)
N	9,304	11,879	9,491	11,690	10,696	10,488	8,588	9,290	10,693	7,184
R^2	0.13	0.14	0.15	0.13	0.14	0.13	0.12	0.23	0.16	0.14

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	HHI		Turnover		ActiveShare		PctNetFlow		Volatility	
	Low	High	Low	High	Low	High	Low	High	Low	High
	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha
PctWk	-0.12	2.05**	3.46***	-0.13	-0.37	2.94***	1.24	1.24	-1.53*	3.66***
	(1.18)	(1.04)	(1.14)	(1.01)	(0.86)	(1.11)	(1.07)	(0.95)	(0.85)	(1.09)
N	7,405	10,473	10,824	10,377	9,816	11,367	11,221	9,963	8,922	12,213
R^2	0.12	0.18	0.13	0.16	0.21	0.11	0.14	0.14	0.15	0.14

Panel B: Sample Split by E-Score.

	E-Score ≤ 2	E-Score = 3	E-Score = 4	E-Score ≥ 5
	Alpha	Alpha	Alpha	Alpha
PctWk	-0.92	-1.31	3.01*	5.18***
	(1.06)	(1.12)	(1.55)	(1.56)
N	5,568	5,396	4,252	5,962
R^2	0.20	0.18	0.13	0.12

Table A2: Effort and Future Performance: Heterogenous Effects, MedWk > 1

The table shows results from estimating Equation 3 to test the relation between effort ($PctWk_1$) and future performance ($Alpha_{13-18}$), while excluding observations unless $MedWk > 1$. In Panel A, the sample is split between high and low groups, subject to the specified criteria. For example, Columns 2 and 3 estimate the the model after splitting the sample between low $TNAM$ mutual funds and high $TNAM$ mutual funds. In Panel B, six characteristics are combined into a variable called $E - Score$ which counts the number of highs and lows corresponding to better returns to effort. Control variables include: $PctNetFlow$, $TNAM$, $Expenses$ $Turnover$, $ActiveShare$, $Competitive$, and $Incentives$. The model always includes style, year-month, and family fixed effects and standard errors are clustered by family-month. Indicators ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel A: Low v. High Based on Mutual Fund Characteristics										
	TNAM		Expenses		Competitive		Analysts		Disagreement	
	Low	High	Low	High	Low	High	Low	High	Low	High
	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha
PctWk	3.07***	0.38	0.93	2.19**	0.66	2.42**	0.65	1.15	1.51	-0.21
	(1.12)	(0.94)	(0.91)	(1.04)	(0.98)	(1.10)	(1.15)	(1.03)	(0.99)	(1.00)
N	8,819	10,856	9,287	10,388	10,420	9,254	7,719	8,459	9,582	6,597
R^2	0.12	0.15	0.15	0.13	0.14	0.13	0.11	0.23	0.16	0.15
	HHI		Turnover		ActiveShare		PctNetFlow		Volatility	
	Low	High	Low	High	Low	High	Low	High	Low	High
	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha	Alpha
PctWk	-1.09	2.43**	2.65***	0.78	0.43	2.53**	1.83*	0.78	-0.43	2.86***
	(1.06)	(1.02)	(0.98)	(1.02)	(0.86)	(1.01)	(0.94)	(0.96)	(0.89)	(0.99)
N	6,634	9,544	9,975	9,722	9,198	10,477	10,328	9,347	8,363	11,196
R^2	0.12	0.18	0.12	0.16	0.20	0.11	0.15	0.14	0.15	0.14

Panel B: Sample Split by E-Score.

	E-Score ≤ 2	E-Score $= 3$	E-Score $= 4$	E-Score ≥ 5
	Alpha	Alpha	Alpha	Alpha
PctWk	-0.10	-1.43	1.22	5.19***
	(1.09)	(1.25)	(1.60)	(1.28)
N	5,311	4,793	3,685	5,882
R^2	0.19	0.18	0.14	0.13

Table A3: Effort and Future Performance – Factor Model Alphas, PctWk > 0

The table shows results from estimating Equation 3 to test the relation between effort ($PctWk_1$) and future performance measured using factor-model alphas over six months from $(t+13)$ to $(t+18)$. The sample is limited to observations where $PctWk > 0$. The table includes alphas from the one-factor ($CAPM$), three-factor ($FF3$), and four-factor ($FF4$) models. Control variables include: $PctNetFlow$, $TNAM$, $Expenses$ $Turnover$, $ActiveShare$, $Competitive$, and $Incentives$. Panel A shows estimates when using the entire sample. Panel B uses $E-Score$, which counts the number of highs and lows corresponding to better returns to effort. The model always includes style and year-month fixed effects while a family fixed effect is only included in Columns 5 through 7. Standard errors are clustered by family-month. Indicators ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. All Observations.						
	CAPM	FF3	FF4	CAPM	FF3	FF4
PctWk	0.40***	0.47***	0.48***	0.20	0.25*	0.28**
	(0.10)	(0.08)	(0.09)	(0.17)	(0.13)	(0.13)
TotalWDs	0.00	0.00	-0.00	-0.00	-0.02	-0.03**
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
PctNetFlow	-0.00	0.13	-0.04	-0.36*	-0.20	-0.33*
	(0.20)	(0.18)	(0.19)	(0.21)	(0.19)	(0.20)
TNAM	-0.00	-0.01**	-0.01**	0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Expenses	-0.13***	-0.12***	-0.12***	-0.11***	-0.09***	-0.08***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Turnover	-0.05***	-0.04***	-0.05***	-0.06***	-0.05***	-0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
ActiveShare	-0.00***	-0.00***	-0.00**	-0.00***	-0.00*	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Competitive	-0.03	-0.02	0.01	0.05	0.01	-0.01
	(0.04)	(0.03)	(0.03)	(0.10)	(0.09)	(0.09)
Incentives	-0.04*	-0.04*	-0.02	-0.05	-0.10	-0.11
	(0.02)	(0.02)	(0.02)	(0.08)	(0.07)	(0.08)
N	17,431	17,431	17,431	17,428	17,428	17,428
R^2	0.19	0.09	0.09	0.21	0.11	0.11

Panel B: Sample Split by E-Score.

	CAPM		FF3		FF4	
	E-Score < 4	E-Score ≥ 4	E-Score < 4	E-Score ≥ 4	E-Score < 4	E-Score ≥ 4
PctWk	-0.28	0.64**	-0.19	0.58***	-0.17	0.62***
	(0.18)	(0.27)	(0.15)	(0.21)	(0.16)	(0.20)
N	8,649	8,779	8,649	8,779	8,649	8,779
R^2	0.22	0.23	0.14	0.12	0.13	0.12

Table A4: Effort and Future Performance – Factor Model Alphas, MedWk > 1

The table shows results from estimating Equation 3 to test the relation between effort ($PctWk_1$) and future performance measured using factor-model alphas over six months from $(t+13)$ to $(t+18)$. The sample is limited to observations where $MedWk > 1$. The table includes alphas from the one-factor ($CAPM$), three-factor ($FF3$), and four-factor ($FF4$) models. Control variables include: $PctNetFlow$, $TNAM$, $Expenses$ $Turnover$, $ActiveShare$, $Competitive$, and $Incentives$. Panel A shows estimates when using the entire sample. Panel B uses $E-Score$, which counts the number of highs and lows corresponding to better returns to effort. The model always includes style and year-month fixed effects while a family fixed effect is only included in Columns 5 through 7. Standard errors are clustered by family-month. Indicators ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A. All Observations.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
	CAPM	FF3	FF4	CAPM	FF3	FF4
PctWk	0.34***	0.49***	0.52***	0.10	0.23*	0.29**
	(0.10)	(0.09)	(0.09)	(0.14)	(0.13)	(0.13)
TotalWDs	-0.00	-0.00	-0.01*	0.01	-0.01	-0.01
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
PctNetFlow	0.02	0.07	-0.09	-0.33	-0.24	-0.34
	(0.21)	(0.19)	(0.20)	(0.22)	(0.20)	(0.21)
TNAM	0.00	-0.00	-0.00	0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Expenses	-0.13***	-0.12***	-0.12***	-0.13***	-0.10***	-0.09***
	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Turnover	-0.05***	-0.05***	-0.05***	-0.07***	-0.06***	-0.06***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
ActiveShare	-0.00***	-0.00***	-0.00***	-0.00***	-0.00**	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Competitive	0.02	-0.00	0.03	0.04	0.04	-0.00
	(0.04)	(0.03)	(0.03)	(0.10)	(0.09)	(0.10)
Incentives	-0.00	-0.01	0.00	-0.04	-0.07	-0.06
	(0.02)	(0.02)	(0.02)	(0.08)	(0.07)	(0.07)
N	16,580	16,580	16,580	16,578	16,578	16,578
R^2	0.18	0.09	0.09	0.20	0.11	0.11

Panel B: Sample Split by E-Score.

	CAPM		FF3		FF4	
	E-Score < 4	E-Score ≥ 4	E-Score < 4	E-Score ≥ 4	E-Score < 4	E-Score ≥ 4
PctWk	-0.13	0.29	-0.10	0.51***	-0.07	0.60***
	(0.18)	(0.21)	(0.16)	(0.18)	(0.17)	(0.18)
N	8,081	8,497	8,081	8,497	8,081	8,497
R^2	0.22	0.21	0.14	0.12	0.13	0.12

Table A5: Effort and Future Performance: Weather Sample

The table shows results from estimating Equation 3 to test the relation between effort ($PctWk$) and future performance (*Alpha*), measured as the compound benchmark adjusted return over six months from $(t+k)$ to $(t+k+6)$ for $k \in \{1, 6, 12\}$. The sample is limited to those mutual funds and fund families for which we can clearly measure location and weather. Control variables include: $PctNetFlow$, $TNAM$, *Expenses* $Turnover$, *ActiveShare*, *Competitive*, and $Incentives$. The model always includes style and year-month fixed effects while a family fixed effect is only included in Columns 5 through 7. Panel A shows estimates using our family-by-month setting. Panel B shows estimates using our new fund-by-month setting. Standard errors are clustered by family-month in Panel A and by fund and month in Panel B. Indicators ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. Family-Level Effort – PctWk						
	Alpha_{1-6}	Alpha_{7-12}	Alpha_{13-18}	Alpha_{1-6}	Alpha_{7-12}	Alpha_{13-18}
PctWk	0.77	1.32**	2.76***	-1.29	-1.35	1.76*
	(0.69)	(0.64)	(0.68)	(1.03)	(0.89)	(1.04)
TotalWDs	0.21***	0.16***	0.11***	0.16*	0.01	0.06
	(0.04)	(0.04)	(0.04)	(0.09)	(0.09)	(0.10)
PctNetFlow	0.37	-3.03**	-3.62***	-3.32**	-6.42***	-7.25***
	(1.41)	(1.29)	(1.36)	(1.55)	(1.38)	(1.33)
TNAM	-0.04**	-0.05***	-0.00	-0.14***	-0.14***	-0.06***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Expenses	-0.65***	-0.92***	-0.84***	-0.58***	-0.76***	-0.51***
	(0.10)	(0.10)	(0.10)	(0.12)	(0.13)	(0.13)
Turnover	-0.07*	-0.06	0.00	-0.19***	-0.22***	-0.12**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)
ActiveShare	-0.02***	-0.02***	-0.02***	-0.01*	-0.01**	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Competitive	0.25	-0.31	-0.64***	1.58**	0.34	0.90
	(0.21)	(0.21)	(0.21)	(0.73)	(0.75)	(0.78)
Incentives	0.02	-0.32***	-0.31**	1.99***	-0.93	-0.56
	(0.12)	(0.12)	(0.13)	(0.72)	(0.78)	(0.73)
N	12,292	12,005	11,983	12,291	12,005	11,982
R^2	0.09	0.09	0.10	0.14	0.14	0.14
Panel B. Fund-Level Effort – PctWkF						
	Alpha_{1-6}	Alpha_{7-12}	Alpha_{13-18}	Alpha_{1-6}	Alpha_{7-12}	Alpha_{13-18}
PctWkF	0.67	1.82*	3.35***	-1.11	-1.02	2.35*
	(1.07)	(0.91)	(0.90)	(1.21)	(1.10)	(1.19)
TotalWDsF	0.26***	0.10	0.01	0.21**	-0.11	-0.09
	(0.08)	(0.08)	(0.07)	(0.10)	(0.10)	(0.08)
PctNetFlow	0.18	-2.87	-3.40	-8.46**	-9.90***	-9.02**
	(2.37)	(2.16)	(2.84)	(3.81)	(3.50)	(3.86)
TNAM	-0.04	-0.05	-0.01	-0.82***	-0.73***	-0.52**
	(0.04)	(0.04)	(0.04)	(0.23)	(0.22)	(0.21)
Expenses	-0.68***	-0.93***	-0.86***	0.55	-0.54	0.03
	(0.25)	(0.24)	(0.25)	(0.50)	(0.57)	(0.42)
Turnover	-0.08	-0.05	0.01	0.07	-0.03	0.09
	(0.09)	(0.09)	(0.10)	(0.17)	(0.16)	(0.17)
ActiveShare	-0.02**	-0.02**	-0.02**	0.01	0.01	0.02
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Competitive	0.28	-0.46	-0.87**	1.32	-0.08	0.53
	(0.40)	(0.38)	(0.41)	(1.14)	(1.25)	(1.12)
Incentives	-0.08	-0.40	-0.39	1.69*	-1.09	-0.89
	(0.25)	(0.26)	(0.27)	(0.99)	(1.11)	(1.03)
N	12,292	12,005	11,983	12,289	12,002	11,975
R^2	0.09	0.09	0.10	0.22	0.20	0.21