(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 to revisit the fundamental questions of asset management: how does effort relate to incentives; and how does effort affect performance? Using unique observations of daily work activity, we define mutual fund manager effort by focusing on weekends. We find that managers facing competitive incentives exert more weekend effort. Focusing on within-advisor variation, we find that more effort follows outflows and increased volatility. Regarding future performance, more effort is followed by higher returns, especially for funds with competitive incentives, high active share, and low turnover. Finally, we use exogenous variation in effort due to weather conditions to demonstrate a causal link between effort and future returns.

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1 Introduction

In their seminal article on the principal-agent problem, Grossman and Hart (1983) propose an optimal incentive scheme between an owner and a manager. The key aspect of the problem is that the principal (e.g., the owner of the firm) cannot observe the agent's (e.g., the manager's) level of effort. While much of the subsequent theoretical literature on the principal-agent problem and agency costs is cast in a generalizable setting, the issues are of particular interest in asset management (i.e., Spatt (2020)). In asset management, the principal typically selects an agent (e.g., a fund manager) based on the agent's superior expertise and understanding of financial markets and investing, potentially exacerbating the unobservability of effort. Moreover, distinct from other organizational settings, the most important input in the production function for asset management is human capital. This helps explain why so much research has tried to distinguish between luck and skill when measuring managerial ability.[1]

Though fund manager effort may be unobservable to investors when making their investment decisions – and indeed, the principal-agent literature developed due to the difficulty of measuring effort – we propose a novel measure of fund manager effort that captures the relative amount of work activity occurring on weekends. We then use this new measure to revisit the central economic questions of asset management: how does effort relate to incentives; and how does effort affect performance?

In 1993, the SEC modernized the submission and retrieval of regulatory forms. Their new system for Electronic Data Gathering, Analysis, and Retrieval (EDGAR) gave interested parties easier access to corporate filings. Among the interested parties were fund managers, who now enjoyed faster and more efficient access to important corporate information (i.e., Crane et al. (2023) and Bowles et al. (2023)). In recent years the SEC released the EDGAR log files, data covering EDGAR usage. By enhancing these data with the identification of investment advisors and fund managers, we observe specific investors accessing specific

[1] For a review of this literature, see Cremers et al. (2019)

filings. More relevant for this study, we observe *when* these investors access filings and, consequently, we can examine *when* investment advisor employees are working, even on weekends.

While fund management is a highly-paid, occupation with an expectation of work outside of routine office hours, we still find considerable time series and cross-sectional variation in the weekend work activities of fund managers. Of the 115 investment advisors in our sample, only eight of them never had employees working on the weekend, thus 107 advisory firms had employees working on the weekends at least once across our sample period. Moreover, across the 90 months in our sample, the average advisor had employees working on the weekend 69% of the time, or 68 out of 90 months (76% or 68 out of 90 months for the median advisor).

In examining the determinants of effort, we find that investment advisors with larger funds, higher fees, and stronger competitive incentives (Evans et al. (2020)) have higher rates of weekend work – a reflection of heightened effort. Focusing on within-investment advisor variation, we find that recent outflows, recent underperformance, and increased idiosyncratic volatility are all associated with relatively more work on the weekends. Together, our findings reveal a strong association between poor performance and higher future effort.

We also study the outcomes of effort while paying particular attention to future portfolio characteristics. Our tests reveal that changes in effort are positively associated with portfolio concentration and active share, and are negatively associated with turnover. Moreover, these associations are strongest with respect to increases in effort, not decreases. These results indicate that increased effort is associated with attempts to enhance investment performance by using more aggressive strategies.

The result that effort follows underperformance and the finding that effort is associated with changes in portfolio construction suggest that effort may be related to future performance. Thus, we test whether increases in effort are associated with increases in future risk-adjusted returns. Our tests reveal that extra effort is associated with long-term outperformance. Specifically, doubling the relative amount of weekend work (doubling effort) at the beginning of a year is associated with a boost of 205 basis points during the first few months of the next year.

The point estimate of 205 basis points, however, only represents the average association across all investment advisors in our sample. But it is reasonable to expect that effort may benefit certain funds/advisors more than others. To explore the heterogeneity of the effort/peformance relation we examine various subsamples of advisors where effort is more likely to generate outperformance. Specifically, we consider advisors with small funds that have low turnover, highly competitive incentives, high active share, and highly concentrated portfolios. Taking this heterogeneity into account, the relation between effort and outperformance becomes more pronounced. Indeed, for the advisors that are most likely to benefit from effort, a doubling of effort is related to a 606 increase in future risk-adjusted returns.

The observed relation between effort and future performance is plausibly endogenous. As such, we use a unique instrument to make a causal connection between effort and performance. For our purposes, the ideal instrument would represent an exogenous shock to the costs of effort without being related to the profitability of future investment opportunities. We propose using local weather, specifically rain, as such an instrument; one that is both ideal and empirically feasible.

Both the psychology and the financial economics literatures show that bad weather increases productivity (i.e., Lee et al. (2014) and Zhang (2022)). Certainly for an employee weighing the opportunity cost of working on the weekend, such as the cost of forgone leisure, the opportunity cost decreases when bad weather eliminates the possibility of outdoor leisure. In other words, it is less costly to work on Saturday when it is too rainy to go to the park. At the same time, it seems highly unlikely that local weather conditions would be related to the prevalence of profitable investment opportunities in public equity markets.

The first stage of our instrumental variables approach shows that rain is associated with increased weekend work, consistent with our proposed instrumental mechanism and the prior literature (i.e., Lee et al. (2014) and Zhang (2022)). We then use this instrument to assess the causal nature of the effort/performance relation and find that exogenous increases in effort are associated with higher risk-adjusted returns. Using subsamples similar to our previous tests, we find that this is especially true 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 examining the effort, incentives, and outcomes of financial professionals. Indeed, the only related paper studying effort empirically is Ben-Rephael et al. (2023), which uses the Bloomberg activity of corporate executives to measure effort and finds that the equity returns are higher for companies with harder working executives, according to their measure. In another paper, Ohneberg and Saffi (2023) use metrics of employee satisfaction at investment advisory firms to show that funds offered by firms with more satisfied employees tend to outperform as well. Finally, while earlier work examined the contracts between investors and investment advisors – largely due to the absence of data detailing fund managers' compensation – recent work by 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 our measure of mutual fund manager effort. Section 3 describes the database we construct for the analysis. Section 4 describes the determinants of our effort measure while Section 5 details our findings with respect to the outcomes of effort. Section 6 provides in-depth results on the relation between effort and future performance. Section 7 describes our instrumental variables approach and Section 8 concludes.

2 Measuring Mutual Fund Effort

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

Though this ideal setting would provide researchers with data on work activity and effort, the high costs 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 manager effort has not been studied empirically in financial economics.

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

2.1 The EDGAR Log Files

The EDGAR Log Files contain billions of observations of "requests" or "requests to view a filing in the EDGAR system." 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

[2]To interpret the observations from the EDGAR Log Files as observations of work activity we assume that the specific activity being recorded – employees within investment advisors reviewing public filings on EDGAR – is positively correlated with other mutual fund manager 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*. The final octet of the IP address is masked. The unmasking of IP addresses is discussed in Appendix A.1.

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. The former measure is called total requests ($TotalReqs$) while the latter measure is called total work-days ($TotalWDs$) given its similarity to the number of total employee work-days.[4]

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

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

Third, this section provides only the 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.

2.2 Work Activity and Effort

Total work-days and total requests measure work activity within a mutual fund family, but it is not clear 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

[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.

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 these measures of work activity and create a proxy for effort, we focus on weekends and holidays to 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. For example, an observation with a value of 7% for $PctWkReqs$ indicates that 7% of all requests in a given month for a given family were made on weekends. Furthermore, an observation with $PctWkReqs$ of 10% suggests that more effort is being exerted as a higher proportion of work is occuring on weekends. In this way, these weekend ratio measures provide a clearer proxy for effort.

With these 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-days and $7,492$ requests.[7]

[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.

[7] 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% and 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.[8]

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 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 ($PctWk$) to use as our main ratio variable.[9] Second, we consider this new 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 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

[8]In untabulated results, the average standard deviations of weekend work-days and weekend requests within families are 6% and 5%, respectively.

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

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

In addition to the EDGAR Log Files, this study relies on two other primary data sources: the Center for Research in Security Prices (CRSP Mutual Funds) Survivorship Bias-Free Mutual Funds Database and the Thomson Reuters mutual fund holdings database. We combine the CRSP Mutual Funds and Thomson Reuters data to obtain mutual fund and mutual fund family level variables, 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.[10]

Our sample covers 90 months – 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.

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

[10]The variables and data sources used in this study are detailed in Appendix A.1.2.

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. Moreover, 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 and to develop a baseline understanding of mutual fund manager effort before testing its relation to future performance, we analyze the determinants of effort. For example, 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?

To answer these and other similar questions we model the determinants of effort as 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 – $PctNetFlow$, *Alpha*, and $Volatility$ – are lagged. Specifically, $PctNetFlow$ 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 – approximately 15% of the entire sample – where $PctWk = 0$. 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 one.

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 have managers that exert more effort than families with smaller mutual funds. As another example, families with more expensive funds have managers that 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 their higher 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, families with harder working managers have higher turnover and lower active share.

Perhaps the most interesting results from the first specification concern the relation between effort and incentives and the relation between effort and performance. Indeed, when it comes to the incentives faced by investment managers – cooperative versus competitive incentives – families with relatively more competitive incentives have managers that exert more effort. This finding confirms common intuition as having more incentives to boost alpha appears to spur managers to exert more effort. With respect to performance, the results suggest that families with harder working managers attract more inflows and have lower idiosyncratic volatility. Thus, there appear to be payoffs to working harder, though it is not clear that high effort families generate more alpha than other families.

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 manager effort. As with size, many of the covariates that explain manager effort across families are statistically insignificant under this specification, with three notable exceptions all relating to performance.

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

[Figure 3 about here.]

Second, Columns 5 through 7 show positive estimates for $Volatility$, suggesting that effort increases after periods of high volatility. Again, the same critique of this interpretation exists as did with fund flows (i.e., the positive coefficient estimate also indicates that effort may decrease after low volatility). As such, we re-estimate Equation 1 using high and low indicator variables to replace $Volatility$. The results, shown graphically in Figure 3, show that it is high volatility that is related to higher effort, not low volatility followed by low effort. This finding provides additional support to the idea that increased effort may be a response to poor performance, this time measured as idiosyncratic volatility.

Third, the estimates for *Alpha* in Columns 5 through 7 are negative, suggesting that effort either increases after periods of low returns or decreases after periods of high returns. To test whether this inverse relation is stronger for low returns or high returns, we again re-estimate Equation 1 using high and low indicator variables to replace *Alpha* and show the results in Figure 3. The results are ambiguous. While Table 4 shows a negative relation between recent returns and effort, it is not clear whether this relation is driven by high or low returns.

What remains 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 (especially in terms of outflows and high volatility) explains variation in effort within families. Together, these findings, as well as common intuition, suggest that effort should influence important outcomes. Otherwise, why exert extra effort after poor performance? Why work harder unless expecting a future 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, $PctWk$.

[Table 5 about here.]

The results show statistically significant relations between within-family effort and future portfolio construction as 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, fund managers also increase fund concentration and the active portions of their portfolios while decreasing turnover. To the extent that higher concentration, higher active share, and lower turnover are indicative of more aggressive investment strategies, these results suggest an association between effort and attempts to enhance future fund performance.

As in the previous section, we also test whether these relations are driven by increases or decreases in effort. To do this we re-estimate Equation 2 while 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 indicate that it is high effort that precedes more concentrated portfolios with higher active share, and not low effort before less concentrated portfolios with less active share. With respect to turnover, the inverse relation with recent effort is the product of both low and high effort.

[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 move on to consider future risk-adjusted returns as the dependent variable of interest.[11]

6 Effort and Future Performance

The previous evidence suggests that increased effort should lead to better performance. Section 4 shows that funds with harder working managers perform better in general and that fund managers appear to increase their effort in response to poor performance. Also, Section 5 shows a positive relation between past effort and portfolio changes that correlate with better performance (e.g., higher active share and lower turnover).

Economic intuition also suggests a positive link between effort and future performance. Foundational models take as given that more effort improves outcomes or increases the likelihood of better outcomes. Given the common intuition and the body of evidence thus far, manager effort should be positively related to future returns. Indeed, we may even expect that fund manager 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 manager effort may not accurately capture effort, but instead measure *busyness* – the notion that employees can do work-like things to look busy without actually doing hard work. If our measure of effort, $PctWk$, measures busyness we would expect to find $PctWk$ leading to lower returns. Similarly, instead of indicating a dedication to work, extra work activities on weekends could indicate overworked managers, which overwork could lead to errors in execution and judgment and, ultimately, to lower returns.

Finally, we measure effort by observing a specific fund manager activity, reviewing public filings on EDGAR. Reviewing more filings, even on the weekends, may be counterproductive as the information being reviewed is *public* information. More effort acquiring public infor-

[11] 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 effort is largely unobservable, especially to mutual fund investors.

mation could come at the expense of effort to acquire *private* (and perhaps more valuable) information. If this were the case, our measure of manager effort would be related to lower future returns.

To test whether manager effort is related 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 effect, 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 with the effect growing stronger 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 returns over the next six months. The effect triples, however, when considering 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 ($k = 12$) by 303 basis points. Also, the strong positive relation when using $k = 12$ holds for all panels in Table 6, regardless of our sample inclusion criteria.

Since these results come from the model that does not include a family fixed effect, at best they suggest that funds with harder working managers generally 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 ($Alpha_{7-12}$).[12] Across all three panels of Table 6, these two columns show either no relation between manager effort and future returns or a negative relation. This can imply that effort is either useless or counterproductive. However, these estimates may result from a time delay between extra effort and future returns. Indeed, it is unlikely that more effort on Monday would result in higher returns on Tuesday. Further, previous results found that effort increases after poor performance. If it takes time for extra manager effort to reverse poor performance, we would expect negative or statistically insignificant estimates in the months immediately following month t.

Focusing on returns further in the future (Column 7) shows a consistent, positive, and significant return to effort. The coefficient estimate of 2.05 in Panel A suggests that doubling manager effort at the beginning of this year is followed by a 205 basis point increase in returns over the first half of next year. Similarly, Panels B and C suggest that doubling effort boosts future returns by approximately 170 basis points.

Overall, the evidence in Table 6 leads us to reject the hypotheses suggesting that effort is counterproductive or just a measure of busyness. Instead, the findings support the hypothesis that increased manager effort is related to higher future returns.

[12] For example, if manager effort is measured in December of 2015, $Alpha_{1-6}$ measures benchmark-adjusted returns in January through June of 2016 while $Alpha_{7-12}$ measures benchmark-adjusted returns in July through December of 2016.

6.1 Heterogeneity of the Effort and Performance Relation

The prior tests use either the full sample of non-missing data or the two subsamples that exclude minimally active families. And though we include a host of control variables (V), our estimates for the relation between manager effort and performance nonetheless capture the average effect across mutual funds. At the same time, it may be that some funds experience higher returns to effort than other funds. In other words, while on average there is a positive relation between manager effort and future returns ,there may be some funds that experience above average returns following increased effort and there are likely other funds that do not experience a return boost following more manager effort. In this section, we use specific subsamples of the data to test whether certain characteristics correspond to a stronger relation between effort and future returns.

To do this we re-estimate Equation 3 after dividing our sample into several groups based on fund-level attributes. Our first series of tests groups mutual funds into high and low subsamples based on their relative rankings across a variety of 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 coefficient estimates of the high-size mutual funds with the low-size mutual funds. Given the previous results, we focus on returns one year inhe future ($k = 12$) and include the family fixed effect. In addition to $TNAM$, we divide the data into high and low subsamples using nine other characteristics that may influence a mutual fund's relation between manager effort and returns, 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 experience a strong return to manager effort while others experience no benefit from extra effort. Smaller and more expensive mutual funds from more competitive families see a strong return to effort: doubling effort yields between 292 and 348 basis points for these types of funds. Further, 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 as 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 manager 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. Furthermore, these results support our findings in Section 4 regarding manager 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 idea.

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 manager effort. For highly competitive funds, doubling effort yields approximately 500 basis points in future returns when paired with low turnover or high active share or recent outflows.

Informed by the subsample results, we combine six fund characteristics into a variable called *E-Score* (short for *Effort Sensitivity Score*). This new fund-level variable counts the number of characteristics (out of six) for which a fund is either high or low in the direction that corresponds with 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* would be six. In contrast, if among these six characteristics a fund has only low $TNAM$ and high $Competitive$, *E-Score* would be two.

In Panel B we report the results from re-estimating Equation 3 on subsamples based on *E-Score*. The results show that only funds with an *E-Score* of at least four experience returns to manager effort. For mutual funds with *E-Scores* of five or six, doubling manager effort is related to an increase in future returns of up to 600 basis points. In other words, small, concentrated funds with low turnover, high active share, high idiosyncratic volatility, and many competitive incentives experience significant performance boosts after increases in manager effort.

Combined with our previous results, the evidence here rejects the notion that manager effort is unimportant or counterproductive. Instead, the results support the idea that effort leads to higher future benchmark-adjusted returns. This section demonstrates an especially strong relation between effort and performance for certain types of mutual funds; namely those with more competitive incentives and those that manage smaller, highly-concentrated portfolios with lower turnover and higher active share.

6.2 Robustness of the Effort and Performance Relation

The tests in Section 6.1 use benchmark-adjusted returns as the proxy for future performance. This section uses three alternative proxies for performance to test the robustness of our results. In place of benchmark-adjusted returns (*Alpha*) we use standard risk-adjusted returns

($CAPM$, $FF3$, and $FF4$).[13] Then, we re-estimate Equation 3 using these as proxies for future performance. The results are reported in Table 8.

[Table 8 about here.]

The results support our main finding – manager effort is related to higher future returns. This holds whether adjusting returns for risk using the CAPM, the three-factor model, or the four-factor model. The results also show that, again, the relation between manager effort and future returns is especially strong for certain mutual funds, namely those with high $E - Scores$.[14]

6.3 Effort and Future Performance: Summary

Of the several hypotheses presented at the beginning of Section 6, we can reject those suggesting that effort is counterproductive, that it is not important, and that our measure of effort proxies for busyness. Instead, the evidence favors the notion that manager 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 whether effort *causes* better performance. Manager effort is endogenous. Our models 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 fund managers will exert more effort when they foresee more profitable opportunities in the future. As a result, the positive relation between effort and performance exists because the likelihood of better performance inspires fund managers to exert more effort (reverse causation). Together with our findings, this logic suggests that capturing high future returns may *require* increased effort, but more effort does not *cause* higher future returns. While effort remains pivotal

[13] Fama and French (1993) and Carhart (1997).

[14] 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.

according to this theory, we need a more careful test to determine whether increased manager effort actually causes higher future returns. We conduct this more careful test in the next section.

7 Causation: Weather and Exogenous Effort

To test whether increased manager effort causes higher future returns we consider an instrumental variables approach using an instrument that explains manager effort while being unrelated to future returns. 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 physical and mental energy, overtime pay, and foregone leisure) the level of effort will decrease. Similarly, when the benefits of effort increase (such as higher future returns) the level of effort will increase.

Viewed this way, instruments related to the benefits of effort may also be related to future returns and fail the exclusion restriction. Thus, we focus our search on the costs of effort. Is there a variable that affects the costs of manager effort? Yes. Local weather conditions.

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 this 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 manager effort. At the same time, weather is plausibly unrelated to the benefits of effort, such as future profitable opportunities. Thus, weather is potentially related to future returns, but only indirectly by influencing the costs and level of effort. As such, as an instrument, weather likely satisfies the exclusion restriction.

We observe weather conditions by city and month. To use weather as an instrument for manager effort, our measures of effort must also correspond to specific cities. However, this is difficult for our family-level measure of effort as it does not account for the fact that some families contain funds scattered across different cities. To correct this, we obtain fund-level measures of manager effort by matching IP addresses to funds (not families) using zip codes.[15] We then re-calculate our measures of work activity and effort ($TotalWDs$ and $PctWk$) at the fund-by-month level, identify fund locations, and match funds with the weather data according to the city of operations.[16]

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

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

where vector V includes *PctNetFlow*, $TNAM$, *Expenses*, *Turnover*, *ActiveShare*, *Competitive*, and *Incentives* and the subscript c indicates location (city). The model includes style, year-month, family, and calendar month fixed effects. We rename our work activity and effort variables as $TotalWDsF$ and $PctWkF$ to indicate these new 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. Including weather conditions, especially *Rain*, helps explain the

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

[16]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.

changing levels of manager effort within mutual funds. As an interpretation of the results; more rain increases manageer effort ($Rain > 0$), though at a decreasing rate ($Rain^2 < 0$). Figure 7 plots this relation, showing that manager effort generally increases during months with relatively more rain. A very rainy weekend, however, may decrease effort. Going back to the thought experiment, while some rain makes leisure less enjoyable, decreases the cost of effort, and increases the likelihood of weekend work, a lot of rain also makes it costly to get to the office. 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.[17]

[Table 9 about here.]

[Figure 7 about here.]

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

$$Y_{ijct+k,t+k+6} = \alpha + \gamma TotalWDsF_{ijct} + \beta Pct\hat{W}kF_{ijct} + \delta V_{ijct} + \epsilon_{ijct}, \tag{5}$$

where Y is either benchmark-adjusted returns ($Alpha$) or risk-adjusted returns ($CAPM$, $FF3$, or $FF4$) and we include style, year-month, family, and calendar month fixed effects. Guided by our previous results, we focus on returns at least one year after the month where weather (and manager effort) are measured, thus $k = 12$. Columns 3 through 5 of Table 9 report the estimates using all four return measures for all non-missing observations. Then, 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 non-missing observations (Columns 3 through 5), the results suggest that exogenous manager effort does not lead to significantly higher future returns. However, approximately half of the mutual funds in these tests have $E - Scores$ of three or lower. And, in all of our previous tests, funds with low $E - Scores$ did not have a positive relation

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

between effort and future performance. Thus, it is not surprising that the average effect is small and statistically insignificant.

When focusing on high $E - Score$ mutual funds – funds we expect to benefit from increased manager effort – the relation between exogenous effort and future returns is positive, large, statistically significant, and robust across all four return measures. From these results, we conclude that increased manager effort has a causal effect on higher future returns.

8 Conclusion

We develop a novel measure of mutual fund manager effort and examine its determinants and consequences. Our new measure uses observable mutual fund work activities and compares the activity on regular workdays with activity on the weekends. We find that manager effort varies over time and across mutual funds. Specifically, managers generally exert more effort between November and February and if they manage large, more expensive funds. Importantly, the hardest working managers come from fund families with more competitive incentives. Further, we find that increases in effort come in response to poor recent performance (i.e., outflows and increased idiosyncratic volatility).

We carefully study the outcomes of effort and find that after mutual fund managers increase their effort their portfolios beocme more concentrated, have higher active share, and experience lower turnover. Moreover, increased manager effort precedes better future performance in terms of benchmark-adjusted and risk-adjusted returns.

To establish a causal link between effort and future returns, we instrument for fund-level manager effort using local weather conditions. Using this instrument, we show that even weather-driven effort leads to higher future returns. Thus, not only is there is positive relation between effort and future performance, but there is a causal link: more effort *causes* higher future returns.

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

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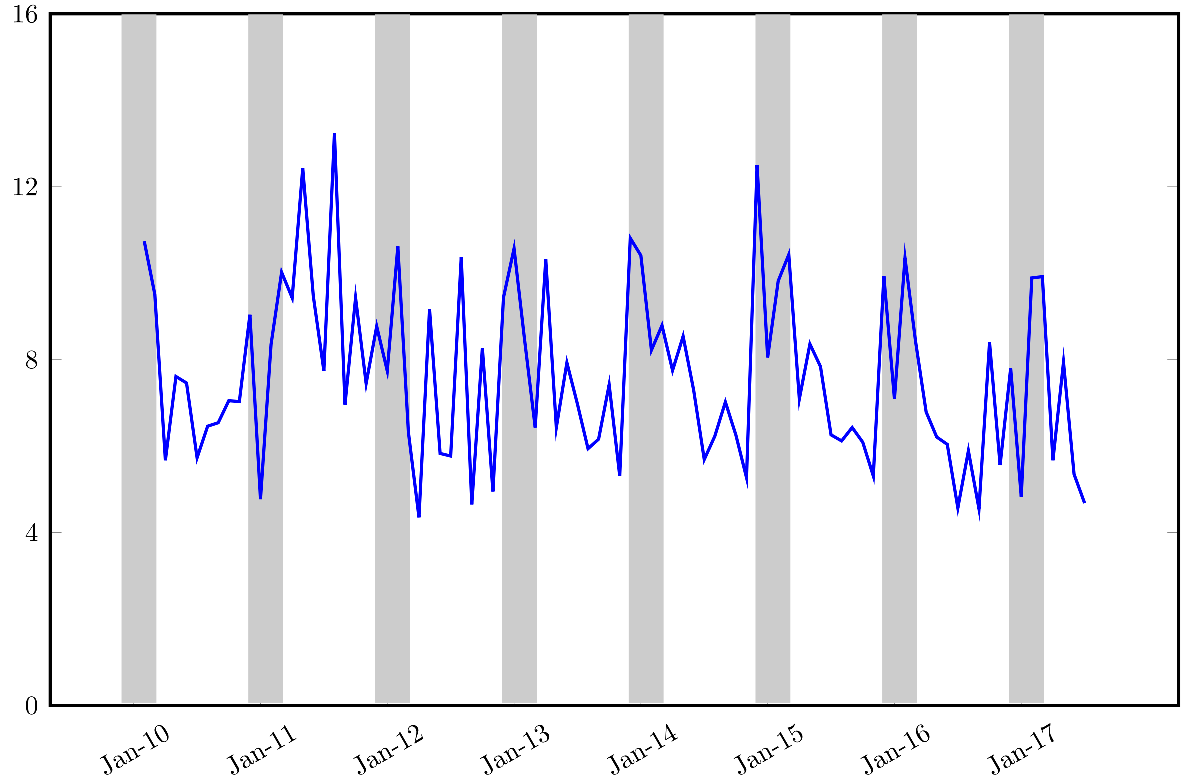
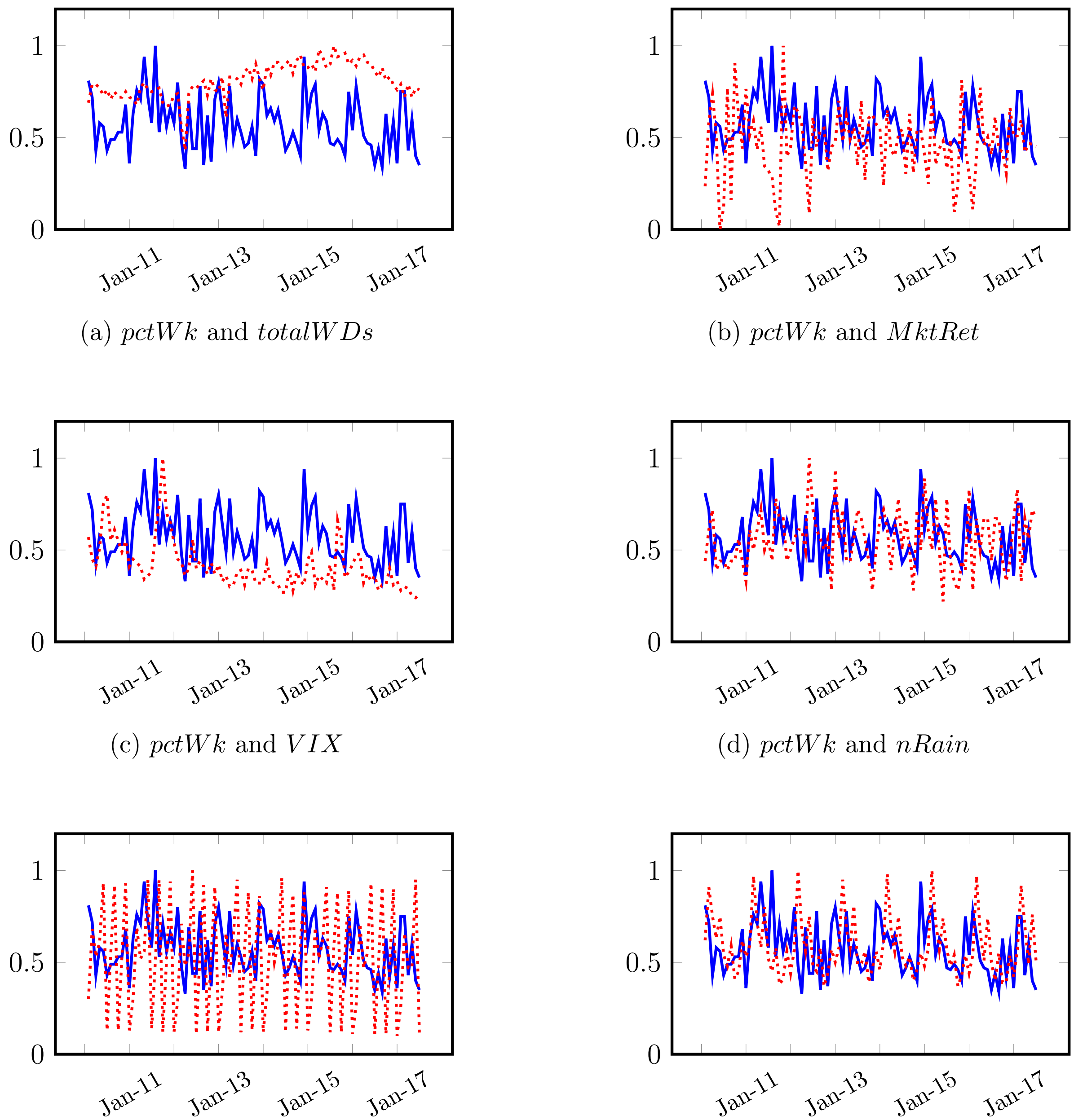


Figure 1: Time Series of Effort

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) $pctWk$ and $totalWDs$

(b) $pctWk$ and $MktRet$

(c) $pctWk$ and VIX

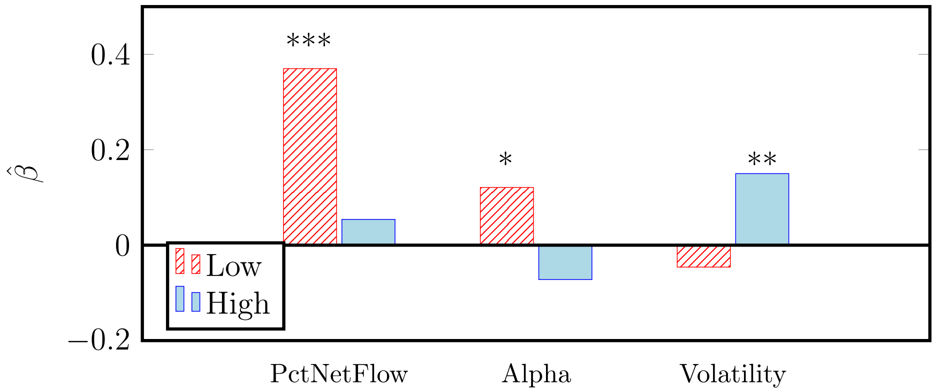
(d) $pctWk$ and $nRain$

(e) $pctWk$ and $eadates$

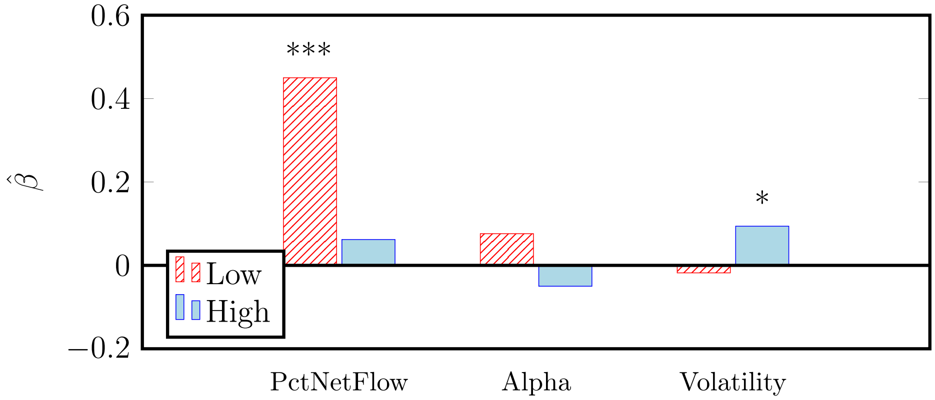
(f) $pctWk$ and $filings$

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

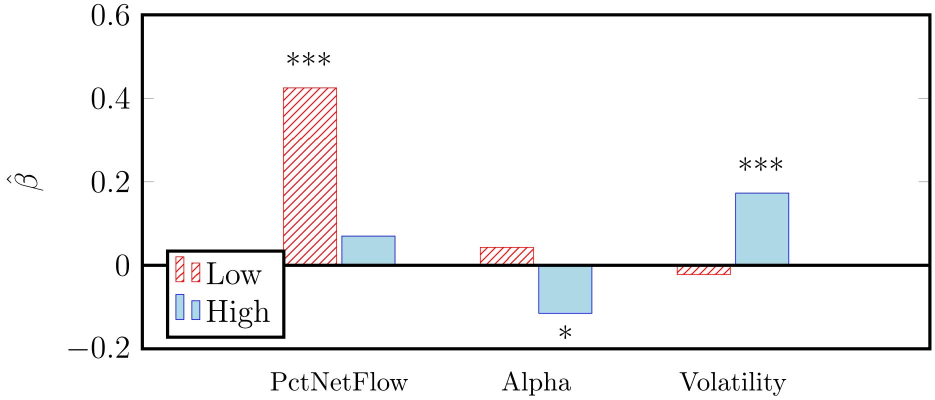
The figure shows the monthly time series of effort ($PctWk$) with other measures, including: activity ($TotalWDs$), market returns ($MktRet$), the market volatility index (VIX), the number of rainy days in New York City ($nRain$), the number of earnings announcements ($EaDates$), and the number of filings 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



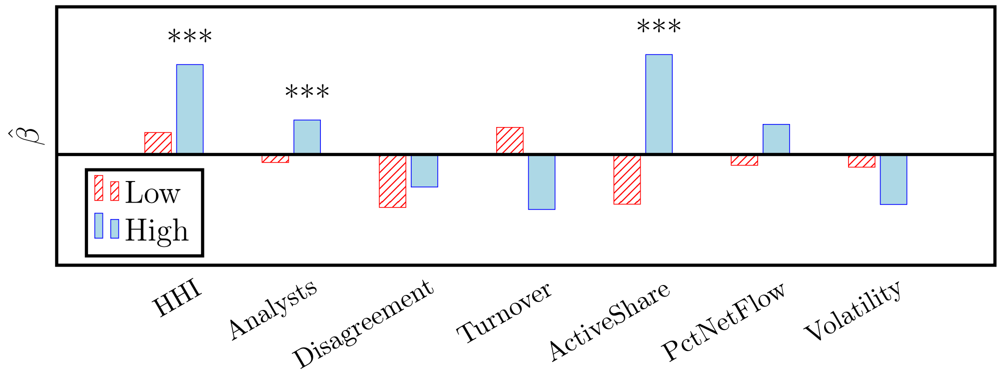
(b) $PctWk > 0$



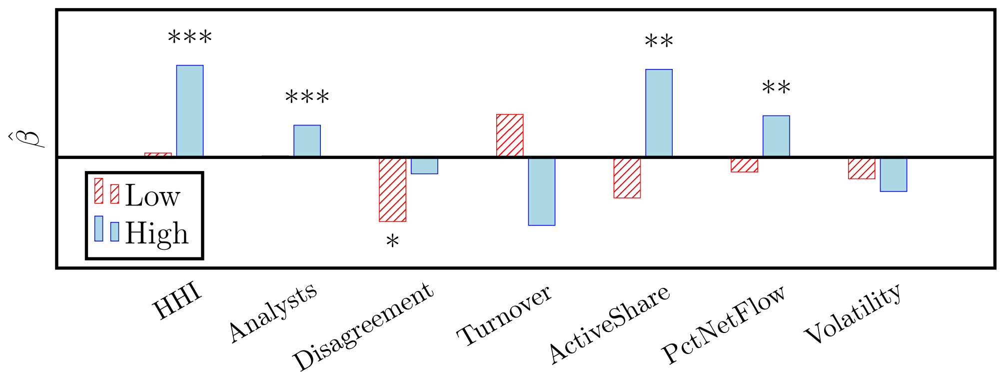
(c) $MedWk > 1$

Figure 3: Low versus High Performance and the Determinants of Effort

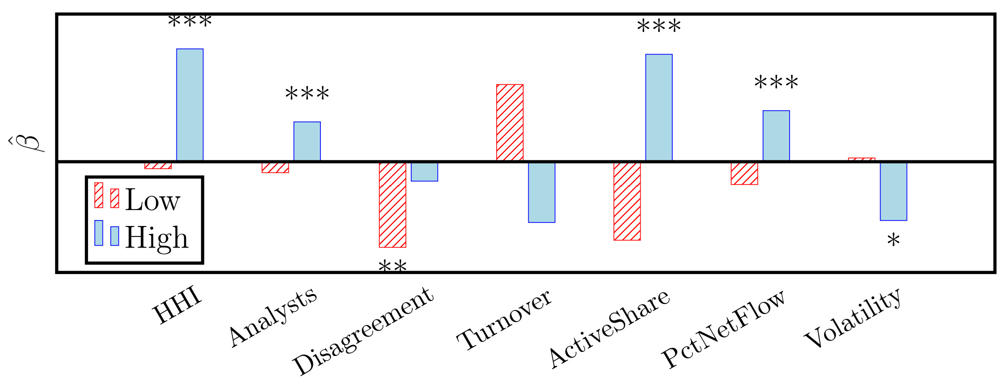
The figure plots coefficient estimates from estimating Equation 1 using high and low indicators in place of the noted continuous variables. For example, the coefficient estimates for $HighPctNetFlow$ and $LowPctNetFlow$ replace the continuous variable $PctNetFlow$. Panel (a) uses the entire sample while 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



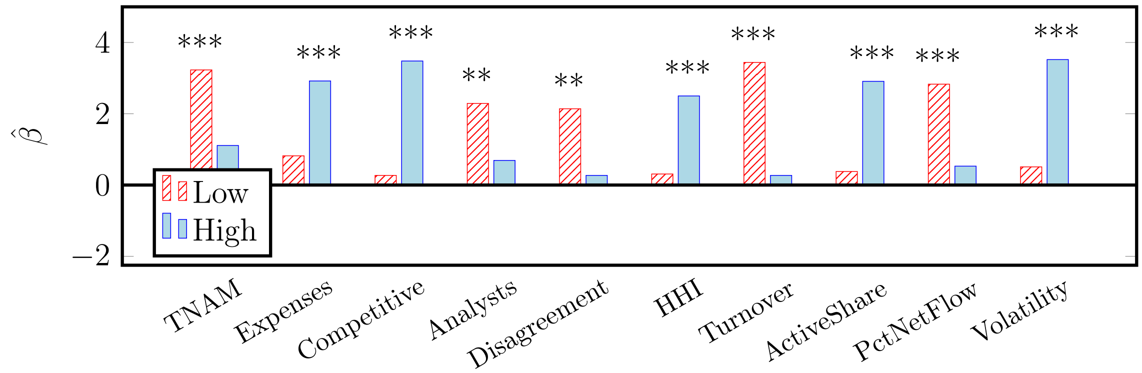
(b) $PctWk > 0$



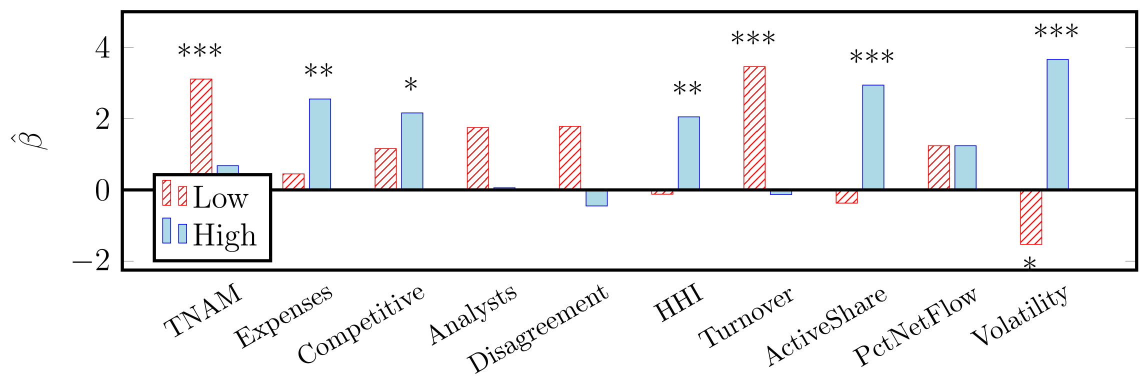
(c) $MedWk > 1$

Figure 4: Low versus High Effort and Outcomes

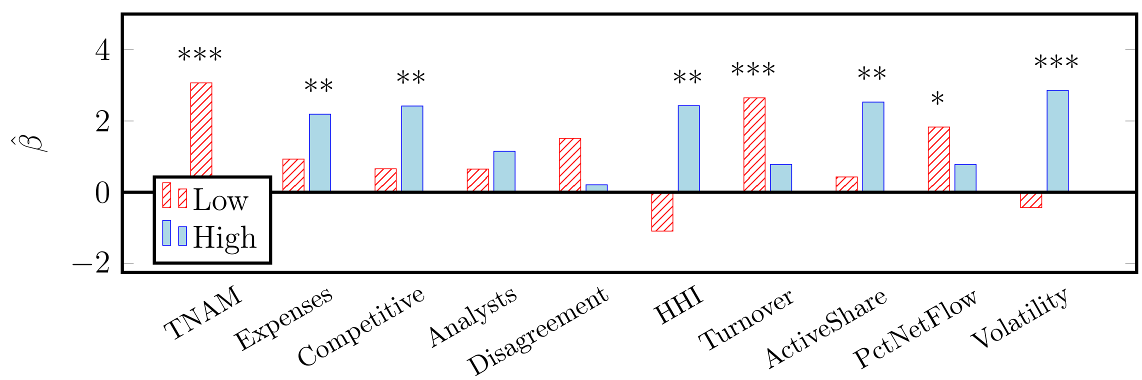
The figure plots coefficient estimates from estimating Equation 2 using high and low indicators in place of the continuous effort variable ($PctWk$). Panel (a) uses the entire sample while Panels (b) and (c) limit the sample as indicated. Standard errors are clustered by family-month. Indicators ***,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

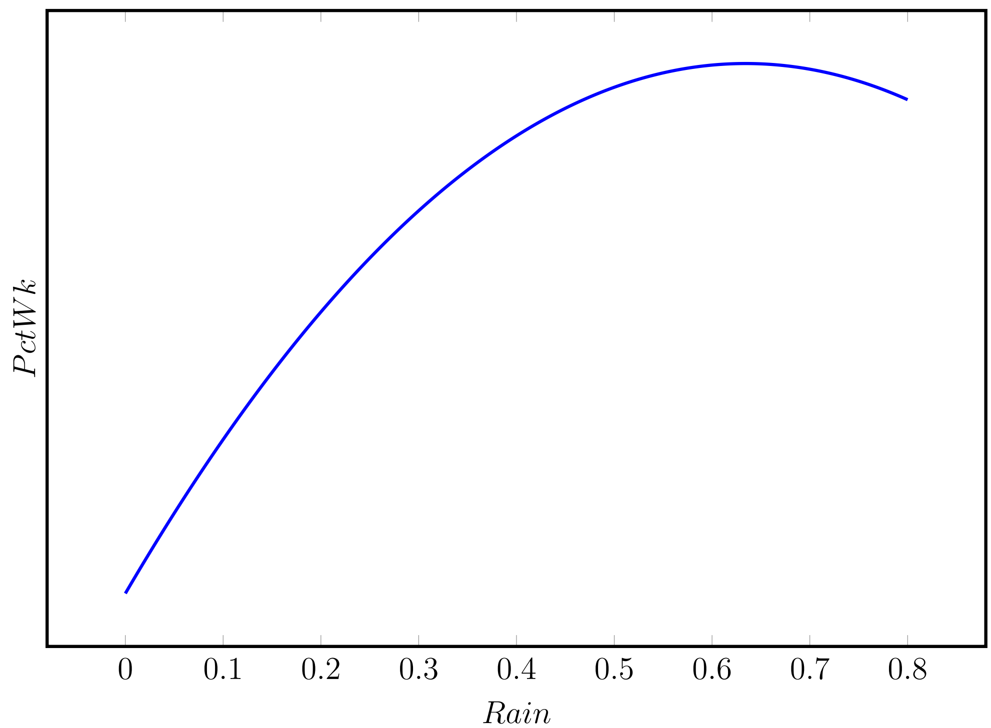


Figure 7: Effort and Rain - 1st Stage

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 factor 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
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 ($PctWk$) 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 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 ($PctWk$) 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 $\geq$ 4	E-Score $<$ 4	E-Score $\geq$ 4	E-Score $<$ 4	E-Score $\geq$ 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 style, year-month, family, and calendar month and standard errors are clustered by yearmonth-family and city. 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	CAPM	FF3	FF4	Alpha	CAPM	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 ($PctWk$) 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 ($PctWk$) 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 ($PctWk$) 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 ($PctWk$) 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 the 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