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# Mutual fund management turnover: a study on fund flows and performance

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# Abstract

This paper studies the effects of managerial turnover on subsequent fund flows and fund performance for actively managed mutual funds. Previous literature studied post-replacement performance extensively; this paper aims to provide new evidence on post-replacement fund flows and the importance of team management for managerial turnover. Pre-replacement poorly performing funds experience negative post-replacement flows. This negative flow is about twice as strong for individually managed funds compared to team-managed funds. This result is only obtained for departing managers and not for new managers arriving at a fund. Pre-replacement outperforming funds experience no abnormal flow after a manager change. In line with previous literature, post-replacement performance deteriorates for pre-replacement outperformers. However, opposing previous literature, post-replacement performance also deteriorates or does not change for pre-replacement poorly performing funds. The findings suggest that fund boards do not have any flow or performance improvement incentives to have management changes. Moreover, it seems that investors make no particular investment allocation mistakes when judging the effects of managerial turnover on performance.

**JEL classification**

G10; G11; G23

**Keywords**

Management turnover; Mutual funds; Investment managers; Fund flow; Fund performance

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# 1. Introduction

Are mutual funds able to improve fund flows and fund performance with manager changes? Mutual funds pay a great deal of attention to advertising their investment managers (Chevalier & Ellison, 1999a). They happily advertise their managers' investment records, even if these performances were at other mutual funds. Besides the funds, the financial media also provides investors with a great deal of information on the individuals in charge of funds. Investment manager profiles are found in major financial magazines, and news of manager changes in mutual funds makes it to business newspapers' front pages. Moreover, even though investor sophistication varies, Barber, Huang, and Odean (2016) showed that investors actively try to identify managerial skill in actively managed mutual funds. All of this proves the perceived importance of mutual fund managers on the investors in a fund, which is why this paper investigates the relationship of manager changes with subsequent fund flows and fund performance.

This paper focuses on actively managed American equity funds aimed at retail investors over 2015-2019 and contains 1,886 manager changes. The research is unique in its focus on the investor response to managerial turnover by studying post-replacement fund flows. Fund flows precisely show the investor response and could be an essential factor for a fund in deciding whether to go through with a manager change or not. Moreover, this paper finds new insights on team-managed funds compared to individually managed funds by studying different management team sizes during managerial turnover. Like Khorana (2001) and Gallagher, Nadarajah, & Pinnuck (2006), this paper separates funds that experienced negative performance (NP) in the year before turnover as a proxy for involuntary turnover and funds that experienced positive performance (PP) in the year before turnover as a proxy for voluntary turnover.

The previous literature on fund flows following managerial turnover is not very extensive. A single paper by Kostovetsky and Warner (2015) studied post-replacement flows and found increases in post-replacement flows for pre-replacement poorly performing funds. These results suggest a rational "window dressing" incentive for fund boards since they know investors are return chasers and expect an improved performance after a change in management if the fund performed poorly (Chevalier & Ellison, 1999b). In this paper, an opposite result is achieved. Generally, a deterioration in post-replacement flows is found. Moreover, the results show a positive relationship between post-replacement flows and pre-replacement performance. However, when separately testing the NP and PP funds, only the NP funds experience negative post-replacement flows, and the PP funds experience no significant change

in flows. So, even if a fund is performing poorly, a manager change only leads to more outflows. These results suggest that it is not in the fund board's interest to have a manager change to improve flow.

A second area addressed in this paper is the effect of team size during managerial turnover. Taking team management into consideration is important as the number of funds managed by teams is growing (Massa et al., 2010; Patel & Sarkissian, 2017). Moreover, on the subject of managerial turnover, investors could rationally respond differently to different team changes. Think of a single manager replaced by another manager or one manager from a team of three replaced by another manager. The first is a team change of 100% of the team and the second only 33%; this could have different implications. A few papers discuss the effects of team management as opposed to single management regarding mutual fund performance and flows. There seems to be no consensus on the effects of team management on fund performance since many papers find different results (see, e.g., Bär, Kempf, & Ruenzi (2005); Bliss, Potter, & Schwarz (2008); Patel & Sarkissian (2017)). However, Bär, Kempf, and Ruenzi (2005) and Bliss, Potter, and Schwarz (2008) found that team-managed funds generally experience higher inflows than individually managed funds. Perhaps funds managed by teams are perceived to be more stable and continuous. This paper finds an opposite result. In general, fund flows are slightly lower for team-managed funds than for individually managed funds. Furthermore, the relationship of fund flows with team management has been further examined but now specifically around manager changes. As established before, post-replacement flows deteriorate, and when splitting funds based on performance, only the poorly performing funds experience this deterioration. When specifically studying different team sizes, this deterioration is generally about twice as substantial for individually managed funds than for team-managed funds. This difference indicates that investors care more about the management of a fund when a single manager is in charge than when a team manages it.

This paper studies all manager changes. Additional to the analysis on specific team changes with team size, departures and arrivals are studied separately. A manager change could mean a team reduction, a team expansion, or a one-for-one replacement. It is not unlikely that investors and thereby flows respond differently to these occurrences. Suppose investors care about who is managing a fund. In that case, it could be argued that they care more about a current manager departing and not about a manager joining the existing team. In this paper, the results indicate that investors only care about manager departures and do not react to team expansions. Though, even for arrivals, a positive relationship is found between past performance and post-replacement flows. However, when studying NP funds and PP funds

separately, there is no particular investor response for either group. Overall, these results suggest that manager departures are viewed as a significant event for mutual funds, but manager arrivals are not.

Lastly, the post-replacement performance has been analyzed to provide information on the consequences of changing investment allocations due to manager changes. Where the previous literature on post-replacement flows is lacking, there are plenty of studies on post-replacement performance. If funds manage to improve their returns, it is expected that fund flows will follow since investors are return chasers (Sirri & Tufano, 1998). The question remains if funds can improve their operating performance with a manager change. The prior literature on fund performance following managerial turnover is somewhat puzzling. On one side, Khorana (2001) and Clare et al. (2014) find an inverse relationship between pre-replacement performance and post-replacement performance. Gallagher, Nadarajah, and Pinnuck (2006) and Denis and Denis (1995) only agree on an improving post-replacement performance for pre-replacement poorly performing funds and find no change in performance for outperforming funds. On the other side, Kostovetsky and Warner (2015) and Goyal and Wahal (2008) argue that there is no improvement in post-replacement operating performance, regardless of prior performance. They state that the old manager would have performed the same as the new one. This paper finds a deteriorating post-replacement performance for both pre-replacement outperforming funds and pre-replacement poorly performing funds. However, the deterioration for pre-replacement poorly performing funds is not robust to the implementation of a second performance measure. Still, regardless of the performance measure, no performance improvements have been found for pre-replacement poor performers.

To conclude, fund flows and fund performance both seem to deteriorate or stay the same after managerial turnover. These findings suggest that fund boards do not have any short-term flow or performance incentives to change management. Furthermore, it shows that retail investors do not make any particular investment mistakes when judging the effects of managerial turnover on fund performance.

The rest of the paper is organized as follows: section 2 discusses the relevant literature to conduct this research and presents the testable hypotheses. Section 3 presents the data. Section 4 discusses the methodology used to test the hypotheses. Section 5 discusses the results on managerial turnover regarding fund flows, past fund performance, team size, and future fund performance. Section 6 presents several additional tests and robustness checks. Lastly, section 7 concludes the paper.

# 2. Literature review and hypotheses development

This section discusses the background information for this research by reviewing the relevant existing literature. Furthermore, the hypotheses will be presented, and their development will be explained. Section 2.1 explains why managerial turnover is studied and discusses the importance of separating voluntary and involuntary replacements. Section 2.2 describes the existing literature on turnover and fund flows. In section 2.3, the effect of team management on funds is discussed. Lastly, section 2.4 reviews the extensive literature on turnover and future performance.

## 2.1 Managerial turnover

It seems logical that investment managers play an important role in generating value for the investors in a fund. However, this does not mean that investors have enough affiliation with certain managers to change their investment allocations due to managerial turnover. A change in management does not necessarily mean a change in fund fundamentals or strategy. Though, investors could be trying to identify managers with superior investment skills. There seems to be an ongoing debate in mutual fund research whether superior managerial skill is even existent or other factors cause that superior performance, but that is a discussion that goes beyond the scope of this paper[1]. Manager changes are a relatively easy fund news event to keep track of. Apart from any possible announcements by the fund itself or other media news sources, Morningstar also keeps track of the managers in charge of funds. Del Guercio and Tkac (2008) showed an immediate flow response to Morningstar rating upgrades and downgrades, proving that some investors carefully monitor fund-related news and even respond to this rapidly. Morningstar rating upgrades have no direct effect on a fund, yet investors respond to this. It is not unlikely that investors monitor manager names and respond to changes in manager names as well.

An important thing to keep in mind when studying managerial turnover is the reason behind a certain manager change. This papers' primary focus is on post-replacement flows and performance. When studying post-replacement flows or performance, the difference between a manager voluntarily leaving a fund or a manager involuntarily leaving a fund should be considered. Think of a firing due to bad performance or any other reason, opposed to a manager leaving due to a better job offer elsewhere or retirement. Investors could reasonably be having a different reaction to either of these events. Unfortunately, as noted in Warner, Watts, and

[1] Papers for more depth on managerial skill in mutual funds: Carhart (1997), Berk & van Binsbergen (2015), and Barber, Huang, & Odean (2016).

Wruck (1988) and Weisbach (1988), identifying forced departures is difficult since press releases often do not describe them as forced departures. Several methods have been used in previous research to determine whether a manager change is voluntary or forced. Kostovetsky and Warner (2015) split subadvisors and in-house managers as a proxy for forced and voluntary departures. They state that in-house managers' departures are more likely to be voluntary because good performance gives in-house managers better opportunities, such as joining hedge funds, causing them to leave (Kostovetsky, 2009). Denis and Denis (1995) used manager age as a proxy, with older managers' departures being more likely to be voluntary. The majority of the research on managerial turnover uses past performance as a proxy for voluntary or forced manager changes, where past poorly performing managers are more likely to be fired than outperforming managers[2]. This rationale is backed by Hu, Hall, and Harvey's (2000) findings, who found a negative relationship between performance and the likelihood of being replaced or demoted. Moreover, they showed that the probability of a manager's promotion is positively correlated with his past and current performance. Past performance will be used as a proxy for voluntary and involuntary resignations in this paper as well.

## 2.2 Managerial turnover and fund flows

There is not nearly as much research on turnover and flows as there is for turnover and performance, which is where this paper aims to provide valuable information to the existing literature. Still, some literature exists on the predictability of managerial turnover, which concerns flows, and some literature discusses post-turnover flows.

Hu, Hall, and Harvey (2000) and Chevalier and Ellison (1999a) found that underperformance by funds before replacement represents a significant managerial turnover predictor. Some papers document a simultaneous decrease in fund flows. Khorana (1996) reported a difference in asset growth rates in the year before turnover compared with the managers that did not have a replacement. Khorana (2001) also studied whether investors withdraw from funds experiencing negative performance and found substantial decreases in fund flows in the pre-replacement period. They provide evidence that negative flows and negative performance are a significant predictor of managerial turnover. Kostovetsky and Warner (2015) also found prior abnormal flow to be an important determinant of managerial turnover, at least for newer managers.

[2] See, for example, Khorana (2001), Gallagher & Nadarajah (2004), and Gallagher, Nadarajah, & Pinnuck (2006).

Kostovetsky and Warner (2015) found improved flows after departures of poor past performers. Furthermore, Chevalier and Ellison (1999b) found that outflows were halved after a manager's departure who performed poorly. These results suggest that fund investors react positively to management changes, which could cause fund sponsors to cater to investors to attract inflow or minimize outflow with managerial turnover, even if negative past performance would be due to bad luck. Based on these results of the previous literature, the following hypothesis is formulated: ($H_1$) fund flows increase after a manager change for pre-replacement poorly performing funds, and fund flows do not change after a manager change for pre-replacement outperforming funds. Furthermore, the previous literature only found improved flows for poor past performers for departing managers. That is why the next hypothesis is as follows: ($H_2$) a significant turnover-flow relationship is only present for funds with departing managers and not for funds with arriving managers (a team expansion).

## 2.3 Team management

Much of the existing literature on the relationship of fund management with fund performance and fund flows do not consider the management teams' size. Though, many papers have documented the growth in team management at mutual funds over the last decades (e.g., Massa et al. (2010); Patel & Sarkissian (2017)). Meaning it becomes increasingly important to consider team size to draw any conclusions on the management's effects on funds. Since this papers' main focus is managerial turnover, team size is of high relevance. The magnitude of a manager change can differ in size. Think of a single manager replaced by another, then 100% of the team changes. However, only 33% of the management team changes when one manager out of three is replaced. Therefore, investors could consider the latter as less important. Different changes can have different implications, and this should be analyzed.

Several researchers have studied the importance of management team size on performance and flows. Bär, Kempf, and Ruenzi (2005) found a weak negative impact of team management on fund performance but find that funds managed by teams are more persistent in their performance. Patel and Sarkissian (2017) disagree in a later study and document that funds managed by teams as opposed to single managers generate higher returns. A third study by Bliss, Potter, and Schwarz (2008) found no significant difference in performance for team-managed funds compared to individually managed funds. There does not seem to be a consensus about the effect of team size on the performance of funds. Though, two of these papers find similar results for the effects of team size on fund flows. Bär, Kempf, and Ruenzi and Bliss, Potter, and Schwarz both find that team-managed funds experience higher inflows

than individually managed funds. A suggested possible explanation for this is that the perceived stability or continuity of the fund management structure attracts more investors.

The effects of team size on flows and performance have been discussed, but the existing literature regarding team size lacks on the subject of managerial turnover. This paper will provide new information on the effects of different team sizes on fund flows during managerial turnover. The paper of Kostovetsky and Warner (2015) is closest to performing such an analysis. They studied managerial turnover concerning performance and flows and weighed the importance of a specific turnover event by taking team size into account. However, they did not present the specific effects of different team sizes on flows at managerial turnover. This paper will try to fill this gap. Based on the rationale that one manager leaving a fund is an increasingly smaller change as the management team size of a fund increases, the following hypothesis is constructed: ($H_3$) the turnover-flow relationship is stronger for relatively smaller teams.

## 2.4 Managerial turnover and future performance

It is only logical for mutual funds to change management if there are expected gains. Gains could be an increase in fund flows or improving performance. The turnover-flow relationship has already been discussed, but a more extensively studied subject is the turnover-performance relationship. For both the board management and the people investing in mutual funds, the performance following managerial turnover is useful information. Board management wants to generate more flows and ensure the return of the funds' investments is as high as possible. Investors want their investment to grow and want to see high returns. The question remains if funds can increase the performance by having a manager change. As for the turnover-flow relationship, it is important to separate forced firings with voluntary departures since a voluntary departure is not the choice of the board management itself, so they have no incentive of increasing performance in the first place. There has been quite some research on this topic, though not all these papers agree with each other.

Firstly, Khorana (2001) found that manager replacements increase post-replacement returns for pre-replacement poorly performing managers and decrease post-replacement returns for pre-replacement outperforming managers. Clare et al. (2014) find the same results for UK funds. Gallagher and Nadarajah (2004) studied Australian funds and agreed on the findings of Khorana and Clare et al.. However, in similar research two years later, they only agree on the performance improvement for pre-replacement poorly performing managers but find no deterioration in returns for pre-replacement outperforming managers (Gallagher, Nadarajah, &

Pinnuck, 2006). Denis and Denis (1995) find similar results where forced resignations are followed by large improvements in post-replacement operating performance.

Secondly, there are papers on managerial turnover that found no particular improvements or deterioration in post-replacement performance. Kostovetsky and Warner (2015) found flow improvements after manager replacement, but they found no specific improvements in operating performance after manager departures, regardless of prior performance. Furthermore, Goyal and Wahal (2008) find no improvements in performance by newly arrived managers for plan sponsors. They state that if the plan sponsor had stayed with the fired managers, their excess returns would be the same as those of the new managers.

Thus, some previous research on performance following managerial turnover found no significant performance changes after turnover. However, most studies find improvements in performance for pre-replacement poorly performing funds and a deterioration in performance for pre-replacement outperforming funds. Therefore, the following hypothesis is constructed: ($H_4$) poorly performing funds having a change in management experience an increase in alpha in the post-replacement year compared to the pre-replacement year, and outperforming funds having a change in management experience a decrease in alpha in the post-replacement year compared to the pre-replacement year.

# 3. Data

The data for this paper is gathered through the CRSP survivor-bias-free mutual fund database. The CRSP Mutual Funds and Fama-French database contains all data needed to conduct this research. The collected data covers the years 2012 up to the end of 2019, of which the first three years are used as an estimation window and the following five years are the research period. So the research period lies between the start of January 2015 and the end of December 2019. All funds that do not have at least one year's worth of data in the research period are deleted. Because of the necessary estimation window, the data of all funds starts in 2012. As the name of the database suggests, the data is free of survivorship bias. Because all funds in the data exist at the beginning of the sample period, the sample does not suffer from the sort of survivorship bias as identified in Elton, Gruber, and Blake (1996) and Brown et al. (1992), which occurs when the only funds included are those that exist at the end of the sample period. This section discusses the sample of funds and manager changes that is used for this research. Furthermore, it will cover how the main variables are constructed and present the descriptive statistics.

## 3.1 Sample description

### 3.1.1 Funds

The research is conducted on actively managed equity funds aimed at retail investors because this paper aims to study the reaction of retail investors to managerial turnover. Moreover, index funds are excluded because the goal is to study investors attempting to identify managerial skill in their fund allocation decisions. The analysis is restricted to funds with a minimum of $10 million total net assets for all observations. Funds that have no data available on their total net assets, which is necessary for calculating the flows, have been deleted. Funds that have not been open to investors at any particular month during the six-year research period and funds that have no manager data available have also been excluded. Because of the necessary estimation window, all funds used in this sample existed in 2012. Some of them will not have survived the five-year research period, which results in a lower number of funds at the end of the research period than at the beginning of the research period. Though, this does not mean that the number of funds has not grown since 2012.

After this data selection, the research will use three split samples, one where all teams are included, one where only teams of up to three people are included, and one where only single managers are included. This split is done to give more insight into the effect of team size on the other variables in this research, which will be explained more thoroughly in the methodology. The main sample used is the sample containing funds with teams of up to three managers and will be referred to as 'the main sample'. Why this is the main sample is explained in the following subsection, where the manager data will be discussed. The final sample has 98,391 portfolio-month observations, with 1,693 equity funds at the start of the research period and 1,566 equity funds at the end of the research period.

### 3.1.2 Managers

The data on manager names in the CRSP database shows the fund managers' individual names in a certain month. So, when there is a change in names, this is observable. However, the database only shows the fund managers' names if the fund has a maximum of three managers. If four or more managers manage a fund, then this is indicated as 'team managed'. If this is the case for a particular fund, then the manager changes cannot be observed. Because the fund could have four, five, six, or more managers, and it will not be shown. Since management changes are the core of this paper, all funds with a single observation that says 'team managed' have been left out of the leading research, which leaves us with only the funds that have single managers and the relatively smaller teams of up to three people. Although, as described before,

**TABLE 1**

*Frequency of team size changes at the event of managerial turnover*

| Team change | Frequency | Percent |
|---|---|---|
| -2 | 48 | 0.05 |
| -1 | 564 | 0.57 |
| 0 (without replacement) | 96,487 | 98.06 |
| 0 (with replacement) | 493 | 0.50 |
| 1 | 705 | 0.72 |
| 2 | 94 | 0.10 |
| **Total** | 98,391 | 100.00 |

Table 1 shows the frequency of the magnitude of a manager change on team size. The column on the left shows the magnitude of a team size change from month *t*-1 to month *t*. If team change is -2, this indicates that the size of a team has decreased by two managers (e.g., from three managers to one manager), and if team change is -1, this indicates that the size of a team has decreased by one manager. If team change is 1 or 2, the size of a team increased by 1 and 2, respectively. If team change is 0, the number of managers in a team has not changed from month *t-1* to month *t*. Even if team change is 0, a manager change could have occurred which is indicated in brackets (e.g., one manager leaves and one manager joins a team). The second column shows the number of months in which such a manager change occurred, and the third column indicates the percentage of months in which a specific manager change occurs in the total sample. Of the 98,391 observations, 1,886 are manager changes.

the whole sample with teams over three people will also shortly be used in this paper to give more insight into the effect of team size on the other variables in this research. As shown in Table 1, the final main sample includes 1,886 manager changes, of which 493 are one-for-one replacements, 612 are departures, and 799 are arrivals. So, a management team changes in 1,91% of the months (22,92% per year). Furthermore, on average, 1,12% of managers leave per month (13,48% per year), and in 1.31% of the months, a new manager arrives in a management team (15.75% per year).

### 3.1.3 Other variables

All variables are gathered from the CRSP Mutual Funds and Fama-French database. These variables contain net returns, assets under management, inception dates, and all Fama and French factors. Inception dates are used to calculate fund age. Expense ratios are found in a separate source within the CRSP Mutual Funds database and are matched with the other variables using the fund identifier. Expense ratios are often only reported by funds at the end of the year. As a result, the expense ratio of funds is only available as a yearly observation. Therefore, the expense ratio has been transformed into a monthly variable to match the rest of the variables, where the last available expense ratio is used for the next period. Furthermore, dummy variables have been created to indicate the months around the event of a manager change.

## 3.2 Descriptive statistics

Table 2 presents descriptive statistics across fund-month observations of the final main sample. Descriptive statistics for the other two samples used in this paper will be presented in the appendix. The first half of Table 2 presents the main fund-level variables. The average fund has a slight negative monthly flow of -0.77% during the sample period, but with a standard deviation of 2.64%, the cross-sectional variation in fund flows is considerably high. The same can be said about fund size, with an average total net assets (TNA) of about 748 million per fund and a standard deviation of 1.65 billion. The fund size median is considerably smaller than the mean at 191 million. Meaning that fund size is positively skewed, so the natural logarithm of this variable is used in all empirical tests. Fund age has a mean of 235 months (about 20 years) and a standard deviation of 133 months (11 years). Fund age is not symmetrically

**TABLE 2**

*Descriptive statistics for the main mutual fund sample*

| Variable | Mean<br>1 | Std. Dev.<br>2 | 10%<br>3 | Median<br>4 | 90%<br>5 |
|---|---|---|---|---|---|
| Percentage fund flow | -0.950% | 2.638% | -3.142% | -0.876% | 1.163% |
| Fund size ($mil) | 747.65 | 1656.10 | 32.30 | 191.30 | 1704.10 |
| Ln fund size ($mil) | 5.385 | 1.514 | 3.475 | 5.254 | 7.441 |
| Fund age (months) | 235.47 | 133.12 | 113.00 | 214.00 | 361.00 |
| Ln fund age (months) | 2.826 | 0.490 | 2.197 | 2.833 | 3.401 |
| Expense ratio | 1.27% | 0.45% | 0.74% | 1.22% | 1.91% |
| Team size | 1.790 | 0.734 | 1 | 2 | 3 |
| 4-factor alpha | -0.164% | 0.475% | -0.623% | -0.143% | 0.226% |
| 4-factor alpha (*t*-12 to *t*-1) | -0.155% | 0.430% | -0.576% | -0.133% | 0.197% |
| 4-factor alpha (*t*-24 to *t*-1) | -0.147% | 0.388% | -0.522% | -0.123% | 0.173% |
| CAPM alpha | -0.202% | 0.513% | -0.734% | -0.167% | 0.275% |
| CAPM alpha (*t*-12 to *t*-1) | -0.196% | 0.465% | -0.657% | -0.159% | 0.224% |
| PPI | 0.276 | 0.447 | 0 | 0 | 1 |
| Volatility (*t*-12 to *t*-1) | 3.576% | 1.679% | 1.576% | 3.358% | 5.685% |

Table 2 presents summary statistics for the major fund-level variables and the performance evaluation variables used in this paper. All variables have 98,391 observations, except for the expense ratio, which has 92,603 observations. All statistics are across fund-month observations from January 2015 to December 2019. Percentage fund flow is the total net assets (TNA) percentage change from month *t*-1 to *t* adjusted for the monthly return in month *t.* Fund size is the market value of the TNA at the end of the month, and Ln fund size is the natural logarithm of Fund size. Fund age is the number of months since the inception of the fund, and Ln fund age is the natural logarithm of fund age. Expense ratio is the annual fee paid to a mutual fund over your investment. Team size is the number of named managers in the fund and ranges from 1 to 3. All alpha variables are calculated using a rolling window regression using the monthly return data and Fama and French factors of the prior two years. 4-factor alpha (*t*-12 to *t*-1) and 4-factor alpha (*t*-24 to *t*-1) are the average monthly 4-factor alpha in the last 12 months and the last 24 months, respectively. CAPM alpha (1-factor alpha) (*t*-12 to *t*-1) is the average monthly 4-factor alpha in the last 12 months. PPI is the positive performance indicator, which is a dummy variable returning 1 when 4-factor alpha (*t*-12 to *t*-1) is positive and 0 when it is negative. Volatility (*t*-12 to *t*-1) is the standard deviation of a fund's net returns in the last 12 months. Percentage fund flow, fund size variables, fund age variables, and expense ratio are winsorized at the 1% and 99% level to protect against data inconsistencies.

distributed either. Therefore, the natural logarithm will be used in all empirical tests. The average annual expense ratio for funds is 1.27%, with a standard deviation of 0.45%. An average team of managers in this sample consists of 1.79 managers.

The second half of Table 2, which follows after the blank line in the middle of the table, presents the performance evaluation variables from the five-year research period used in this paper. All alpha variables are calculated using rolling window regressions. For this calculation, the net returns and the Fama and French factors of the prior two years have been used. The average monthly four-factor alpha is negative at -0.164% per month. For the prior 12 and prior 24 months, the monthly average four-factor alpha is negative at -0.155% and -0.147%, respectively. The negative four-factor alphas are consistent with existing mutual funds research, where underperformance of mutual funds is well-documented (Malkiel, 1995). The CAPM alphas, where only the market factor is used in the alpha estimation, are slightly lower than the four-factor alphas. Documented is an average negative monthly CAPM alpha (1-factor alpha) of -0.202%, and when looking at the average monthly CAPM alpha in the past 12 months, it is -0.196%. The positive performance indicator (PPI) is a dummy variable showcasing if a fund experienced positive performance in the last 12 months. PPI returns a value of one if a fund experienced a positive average monthly four-factor alpha in the past 12 months and zero if the fund experienced a negative average monthly four-factor alpha in the past 12 months. PPI is 1 for 27,6% of the observations, indicating that funds primarily have a negative average four-factor alpha over the previous year. Lastly, the mean monthly return standard deviation of the sample is 3.576%.

# 4. Methodology

In this section, the methodology used to answer the hypotheses will be presented. Section 4.1 shows how fund flows are computed. Section 4.2 is about the different fund performance measures used in this paper. Section 4.3 explains why the chosen event window is used. Section 4.4 describes the performance evaluation horizon that is used. Section 4.5 describes the empirical tests this paper uses to analyze the relationship between managerial turnover and flows. Lastly, section 4.6 explains how the effect of managerial turnover on future performance is studied.

## 4.1 Mutual fund flows

When looking at investor flows for funds, there is no data source providing separate data on the inflows and outflows of funds. Therefore, the best way to get insight into the funds' flows is to

calculate them using the total net assets. Following Barber, Huang and, Odean (2016) and the majority of the prior literature on fund flows, the flows for fund *p* in month *t* are calculated as the percentage growth of new assets, assuming that all flows take place at the end of the month:

$$Flows_{pt} = \frac{TNA_{pt}}{TNA_{p,t-1}} - \left(1 + R_{pt}\right), \quad (1)$$

where $TNA_{pt}$ is the total net assets under management of fund *p* at the end of month *t*, and $R_{pt}$ is total return of fund *p*, in month *t*. By doing this, the increase or decrease in total net assets of a fund in a certain month that is accountable to the return on assets is eliminated. Therefore, only the difference in total net assets that is accountable to investor flows is left.

## 4.2 Mutual fund performance

In this paper, two fund performance measures are used: the alpha of Sharpe's (1964) one-factor Capital Asset Pricing Model and Carhart's (1997) four-factor model. The four-factor model is widely used in mutual fund research where performance is studied[3]. The CAPM model is added for additional robustness. Barber, Huang and, Odean (2016) even found the CAPM alphas to be the best predictor of flows among several competing performance evaluation models. However, they document that the flow response to factor-related returns (size, value, momentum, and industry) is nearly as strong as the response to a fund's alpha. The four-factor model includes the three-factor model of Fama and French (1993) and the momentum factor of Jegadeesh and Titman (1993). The four-factor model is used to improve the average pricing errors of the single-factor model. It is also beneficial in conducting performance attribution analysis for ascertaining the source of performance and the underlying investment strategies that portfolio managers pursue.

Alpha estimates are updated monthly based on a rolling estimation window. To estimate the alphas for each fund month in *t*, the following time-series regressions are used, using 24 months of returns and factor variables data from months τ = *t*-1, *t*-24. Respectively, the CAPM model and the four-factor model are specified below:

$$R_{p\tau} = \alpha_{pt} + \beta_{1,pt} RMRF_{\tau} + \varepsilon_{p\tau} \quad (2)$$

$$R_{p\tau} = \alpha_{pt} + \beta_{1,pt} RMRF_{\tau} + \beta_{2,pt} SMB_{\tau} + \beta_{3,pt} HML_{\tau} + \beta_{4,pt} MOMF_{\tau} + \varepsilon_{p\tau} \quad (3)$$

[3] See, for example, Wermer (2003), Gallagher, Nadarajah, & Pinnuck (2006), Berk & Van Binsbergen (2015), Kostovetsky & Warner (2015), and Barber, Huang, & Odean (2016).

where $R_{p\tau}$ is the fund return in excess of the risk-free rate of fund *p*, at month $\tau$, RMRF is the value-weighted market return in excess of the risk-free rate, SML (small minus big) is the size factor capturing the difference in returns across small and big stock portfolios, HML (high minus low) is the value factor capturing the difference in returns between high and low book-to-market equity portfolios, and lastly, MOMF is the momentum factor computed in Carhart (1997) capturing the difference in return for the firms with the highest returns against the firms with the lowest returns in the last year. The factors RMRF, SMB, HML, MOMF, and the risk-free rate are all directly downloaded from the CRSP Mutual Funds and Fama-French database.

## 4.3 Event window

This paper studies the event of a change in a portfolio management team on investor flows. However, this paper will not use traditional event study methodology to calculate abnormal flows. Instead, OLS regression models will be used to study if a manager change significantly impacts flows. Because of this, it might not be possible to precisely test per month in which months investors react to manager change. However, it is important to pick an event window in which a reaction is expected from investors. Two different timeframes will be used to test if there are short- or long-term implications. Because the studied group of investors are not institutional investors, they might not instantly react to this event since individual investors will not monitor their investments as often as institutional investors. Although, it would be wrong to assume that none of them frequently monitor their investments. There is no turnover announcement data available, so only the actual month in which a manager is replaced can be observed and studied. This is not a problem for this subject. If investors care about manager replacements and react to them accordingly, there is not much reason to act on the announcement of a manager replacement. The fund management team will stay the same until the date of the actual replacement, which is when it might be interesting for an investor to reconsider his investments.

The event windows chosen to study the time frame in which investors react to a manager change are *t-1* to *t+2* and *t-1* to *t+5*, where *t* is the month of the manager change. The month before the actual manager change is included to account for investors monitoring their investments thoroughly. If an investor is very active and wants to change his portfolio due to a manager change, then it is likely he will do so very close to the actual manager change, which could be in the month before the change or during the month of the change and that would be month *t*. Though taking into account numerous frictions like inertia, inattention, and transaction

costs, most retail investors will probably not have such a quick response to this event. That is why two months are added to study the short-term implications on investor flows surrounding a manager change. Overall, this leads to an event window of 4 months, assuming that most investors will have reacted in this time window. The second time window is added to study if there are investors who react even slower. Furthermore, it should be safe to assume that flows happening over six months after a manager change are no longer a reaction to that specific event.

## 4.4 Performance evaluation horizon

Investors responding to manager changes will rationally be doing this because of their expectations of the manager's skill. They will be doing so by rewarding skilled managers with deposits and punishing unskilled managers by withdrawing money. It should be considered how these investors approach their judgment of managerial skill. Logically, they would look at past returns, and if more sophisticated, at the manager's ability to outperform the market, taking into account the market factors. So, four-factor alphas are used. After that, a decision has to be made on how far investors look into the past to define managerial skill. For this paper, the average of 12 monthly alphas will be used as investor's performance evaluation horizon. To give more insight into how far investors look back, the average of 24 monthly alphas will also be used as an additional test, similarly to the method of Kostovetsky and Warner (2015).

Barber, Huang, and Odean (2016) make some valid points on how investors weigh past returns when assessing fund manager skill. They argue that investors should balance relevance so that recent returns are more likely to be informative about the current ability of a manager. Moreover, the signal-to-noise ratio should be considered, which states that short-term returns are mostly noise with little signal about returns. Their solution is to capture the decay in the flow-return relationship, where they give weights to the importance of the returns from a specific month to an investor's judgment. An exponential decay function shows that investors care more about recent returns than distant returns. Barber, Huang, and Odean's paper is a similar study trying to capture investor response to managerial skill in mutual funds. Even though this paper uses absolute alphas of the past months, Barber, Huang, and Odean's exponential decay values will be used to calculate a weighted average of the alphas of the past 12 months as an additional robustness test of the results.

## 4.5 Empirical tests for the impact of managerial turnover on fund flows

This section describes the methods used to determine the effect of managerial turnover on mutual fund flows. Different models give insight into how past fund performance, team size, and different management team changes play a role in the turnover-flow relationship.

### 4.5.1 Past performance

Two main models have been constructed to study the effect of managerial turnover on mutual fund flows. The model needs to capture the effect of turnover conditional on prior performance. The following model is used first:

$$\begin{aligned} Flows_{pt} = \alpha_{pt} &+ \beta_1 \, (FundPerformance)_{p,t-1} + \beta_2 \, (ManagerTurnover)_{p,t-1} \\ &+ \beta_3 \, (FundPerformance)_{p,t-1} * (ManagerTurnover)_{p,t-1} \\ &+ \beta_4 \, (ExpenseRatio)_{p,t-1} \\ &+ \beta_5 \, (\ln(FundSize))_{p,t-1} + \beta_6 \, (\ln(FundAge))_{p,t-1} + \varepsilon_{pt} \end{aligned} \quad (4)$$

where $Flows$ are the flows for fund p, at time *t*. *Fund performance* is the average four factor alpha of the past 12 months. *Manager turnover* is a dummy variable that returns a value of 1 for the month before a turnover occurs, in the month a turnover occurs, and in the subsequent two months. When there is no turnover, the variable is 0. The *expense ratio* is added as a control variable because higher expenses are likely to deter new investors since the investors cut of the returns will be lower if a fund has a higher expense ratio. *Fund size* is the total net assets under management of a fund and is added as a control variable since larger funds receive lesser percentage flow for the same dollar amount. *Fund age* is an often-reoccurring significant variable in mutual fund flow research and is therefore added as a control variable[4]. Most importantly, Berk and Green (2004) found that fund age attenuates flow sensitivity.

To provide more insight into the fund performance-turnover relationship, another model is constructed, which is similar to the previous model:

[4] See, for example, Barber, Odean, & Zheng (2005), Huang, Wei, & Yan (2012), Berk & Green (2014), Kostovetsky & Warner (2015), and Barber, Huang, & Odean (2016).

$$Flows_{pt} = \alpha_{pt} + \beta_1 (PPI)_{p,t-1} + \beta_2 (ManagerTurnover)_{p,t-1} + \beta_3 (PPI)_{p,t-1} * (ManagerTurnover)_{p,t-1} + \beta_4 (ExpenseRatio)_{p,t-1} + \beta_5 (\ln(FundSize))_{p,t-1} + \beta_6 (\ln(FundAge))_{p,t-1} + \varepsilon_{pt} \quad (5)$$

where the only adjustment to model 4 is that fund performance has been replaced by a *positive performance indicator (PPI)*, indicating if a fund experienced positive performance (PP) or negative performance (NP) in the previous year. It is a dummy variable returning a value of 1 if a fund experienced a positive average four-factor alpha in the past 12 months and 0 if the fund experienced a negative average four-factor alpha in the past 12 months. This method was also used similarly by Khorana (2001). The performance indicator is used as a proxy for the reason behind replacement. Khorana argued that in the absence of publicly available information on the rationale behind replacement, such a portfolio decomposition approach serves as the next best alternative. Because of this, both models 4 and 5 can provide valuable information for this paper.

### 4.5.2 Team size

The funds used in this paper are managed by varying management team sizes. For the main research, only the funds with a management team of one, two, and three people will be studied since the exact manager changes are still observable for this sample. It is important to consider the management team's size during a turnover to study and conclude anything on the turnover-flow relationship. Manager changes can vary in magnitude. Think of a single manager leaving a fund versus one manager leaving a team of three; this could have different implications and should be analyzed. Some tests will be set up to dive deeper into the importance of team size.

As a first test of the effect of team size on the turnover-flow relationship, the funds included in the analysis will be reconsidered. When a team reaches four people, the data in the CRSP Mutual Funds database will regard it as "team managed", therefore giving no insight into any managerial turnover. For this reason, funds with four and more managers were excluded from the research. To give insight into the turnover-flow relationship concerning team size, these funds will be brought back. Model 4 and model 5 will be run again, but now with funds with four and more managers in the mix. All funds with a "team managed" label will receive a value of four as their team size. This new setup will compare large teams and small teams, providing relevant information on the importance of team size. Though, the only extra managerial turnover that will be captured in this sample is that of teams switching between

three and four managers. For example, if a management team of four replaces one of the four managers with another, the data will not present this. Furthermore, the same will be done solely with funds with a single manager. Models 4 and 5 will be run again, but now for a sample with only funds with single managers. Using this sample will provide a clear comparison between individually managed funds and team-managed funds. Next to that, it will give more precise results on manager replacements for funds with single managers, which could be valuable information.

A new model is used as a second test of the effect of team size on the turnover-flow relationship. This model aims to find a more precise effect of specific team sizes on the turnover-flow relationship. The main sample with management teams up to three people, and the sample with all management team sizes will be used. The following model is used:

$$\begin{aligned} Flows_{pt} = \alpha_{pt} &+ \beta_1 \left(ManagerTurnover\right)_{p,t-1} + \beta_2 \left(TeamSize\right)_{p,t-1} \\ &+ \beta_3 \left(ManagerTurnover\right)_{p,t-1} * \left(TeamSize\right)_{p,t-1} \\ &+ \beta_4 \left(FundPerformance\right)_{p,t-1} + \beta_5 \left(ExpenseRatio\right)_{p,t-1} \\ &+ \beta_6 \left(\ln(FundSize)\right)_{p,t-1} + \beta_7 \left(\ln(FundAge)\right)_{p,t-1} + \varepsilon_{pt} \end{aligned} \quad (6)$$

where the model is almost identical to model 4 once again. This time the adjustment is that the interaction between manager turnover and the average monthly performance of the past year has been replaced with an interaction between manager turnover and team size. *Team size* in this model is a categorical variable, ranging from 1 to 3, simply indicating the number of managers active in a management team. By making it a categorical variable, a potential effect of team size will be easily distinguished within different team sizes. Furthermore, fund performance has been removed from the interaction but is now added as a control variable in the model since past fund performance is likely to affect fund flows.

### 4.5.3 Departures and arrivals

Another distinction to be made besides team size is that of the specific changes in team management. In this paper, managerial turnover has been defined as any change in management. When looking at managerial turnover, this could mean three things: a manager replacement, a team expansion, or a team reduction. However, these are three different things, and investors possibly react differently to them. Like Kostovetsky and Warner (2015), some previous literature only studied departures in their managerial turnover research. If investors care about management and, in particular, about the specific people in a management team,

then it could be argued that they would be most interested in managers departing. If no manager leaves, but the management team gets expanded with a new manager, they might not care as much. In this paper, the goal is to learn as much as possible about the turnover-flow relationship. So, it is essential to separate the two and see if there are different flow responses to be found. Another point of interest is the relationship of departures and arrivals with prior performance. Studying this might provide insight into the choices that funds make concerning their management teams.

In this paper's previous models, a dummy variable has been used to distinguish the months in which there could be a reaction to a manager change and the months where there is no turnover. The dummy variable indicated every possible change in management. However, to capture the differences between departures and arrivals, two new dummy variables have been created to replace the old dummy variable. Model 4 and model 5 will be brought back, but now with departures and arrivals separated. The turnover dummy in model 4 and model 5 will be replaced with a new dummy variable, one focused on departures and one focused on arrivals. The departures dummy variable returns a value of 1 for one-for-one replacements, one manager leaving, and two managers leaving at once. The arrivals dummy variable returns a value of 1 for one-for-one replacements, a team expansion with one manager, and a team expansion with two managers. Like the old dummy variable, the variable will indicate a departure or an arrival for the months *t-1* to *t+2*, with the managerial turnover taking place in month *t.* The rest of the observations will have a value of 0. The decision has been made to include one-for-one replacements in both variables since this includes a departure and an arrival. Though, this does mean that there is an overlap in the variables. The same tests will be done with both variables without the one-for-one replacements to ensure that the one-for-one replacements do not heavily change the results.

## 4.6 Managerial turnover and future performance

After establishing if investors respond to managerial turnover, the question is if this response is justified. There has been more extensive research on managerial turnover and the performance following the turnover. Still, it will be interesting for this dataset to know if investors make the right decision on their investments by studying the performance following manager changes. The same methodology will be used as in the paper of Gallagher, Nadarajah, and Pinnuck (2006) to test the effect of managerial turnover on future performance. A performance comparison will be made between the 12-months pre-turnover and the 12-months post-turnover. Both the four-factor alpha and the CAPM alpha will be used for robustness. For

both periods, the mean and median will be studied to find any improvement or deterioration in fund performance after managerial turnover. Funds that experienced positive performance and funds that experienced negative performance in the past year will be separated for this analysis. Separating will give a clear view if outperforming funds can keep up the good performance and if poorly performing funds can improve their performance by having a manager change. A paired *t*-test and the Wilcoxon signed-rank test will be used to test if there is any significant difference in the mean or median for the post-turnover period compared to the pre-turnover period.

# 5. Results

In this section, the results of the regressions will be displayed and interpreted. Section 5.1 explains the effect of managerial turnover on fund flows, conditional on prior performance. Section 5.2 handles the effect of team size in the turnover-flow relationship. Section 5.3 discusses how the results differ when splitting departures and arrivals. Lastly, section 5.4 briefly discusses managerial turnover and future performance to tell if any possible flows after turnover are justified.

## 5.1 Managerial turnover, fund flows, and past performance

The results of model 4 and model 5 on the three samples used in this paper are displayed in Table 3. Column 1, where the results for the main sample are shown, will be discussed first. A first conclusion drawn from model 4 is that prior fund performance positively affects investor flows. So, good performance will generate flows in the future, which falls in line with existing literature like Chang, Solomon, and Westerfield (2016) and Wermer (2003). A second conclusion drawn is that managerial turnover generally hurts fund flows in the surrounding months of the manager change, regardless of prior performance. The interaction variable on manager turnover and fund performance shows that the performance-flow relationship is even stronger in the event of managerial turnover. So, investors deposit even more into a fund that performed well in the past, surrounding a change in management. Moreover, investors withdraw from a fund surrounding a manager change if it performed poorly in the past year.

Model 5 has been constructed to dive deeper into why these results are found. In this model, again, fund performance shows to have a positive relationship with flows. The turnover dummy is also significant again but is interpreted differently than in model 4. Here it only covers the funds that performed poorly in the previous year and had a manager change. A manager change negatively affects flows for poorly performing funds in the surrounding

**TABLE 3**

*Effect of managerial turnover and prior performance on fund flows*

| | Dependent Variable = *Fund Flows* | | | | | |
|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | |
| | No teams above 3 | | With teams above 3 | | Single Managers | |
| | Model 4 | Model 5 | Model 4 | Model 5 | Model 4 | Model 5 |
| Constant | -0.000 | -0.003*** | 0.002*** | 0.000 | -0.003* | -0.006*** |
| | (-0.56) | (-4.08) | (4.52) | (0.77) | (-1.86) | (-3.29) |
| Fund performance | 0.534*** | | 0.624*** | | 0.473*** | |
| | (22.53) | | (30.28) | | (11.36) | |
| PPI | | 0.007*** | | 0.006*** | | 0.007*** |
| | | (32.26) | | (37.46) | | (16.39) |
| Turnover dummy | -0.002*** | -0.003*** | -0.002*** | -0.002*** | -0.008*** | -0.006*** |
| | (-4.74) | (-6.43) | (-7.27) | (-9.40) | (-4.84) | (-4.03) |
| Fund performance | 0.277*** | | 0.198** | | -0.357 | |
| * Turnover dummy | (3.08) | | (2.58) | | (-1.00) | |
| PPI * Turnover | | 0.001 | | 0.001 | | -0.005 |
| dummy | | (1.48) | | (1.17) | | (-1.25) |
| Expense ratio | -0.394*** | -0.422*** | -0.505*** | -0.550*** | -0.150*** | -1.71*** |
| | (-19.47) | (-21.01) | (-36.68) | (-40.18) | (-2.70) | (-3.09) |
| Ln(fund age) | -0.002*** | -0.002*** | -0.003*** | -0.002*** | -0.002*** | -0.002*** |
| | (-11.71) | (-10.87) | (-20.75) | (-20.28) | (-4.70) | (-4.33) |
| Ln(TNA) | 0.001*** | 0.001*** | 0.001*** | 0.001*** | 0.001*** | 0.001*** |
| | (10.10) | (8.73) | (15.95) | (14.35) | (6.24) | (5.39) |

Table 3 presents regression coefficient estimates from six multivariate regressions on percentage fund flow, which is the TNA percentage change from month *t*-1 to month *t*, adjusted for the return in month *t*. Model 4 and model 5 are run on three different samples. In column 1, all funds with up to three managers are included. In column 2, funds with all team sizes are included, and in column 3, only individually managed funds are included. The samples of columns 1, 2, and 3 have 98,391, 168,292, and 19,722 observations, respectively. Fund performance is the average monthly 4-factor alpha in the last 12 months. PPI is the positive performance indicator, returning 1 when the average 4-factor alpha of the past 12 months is positive and 0 when it is negative. Turnover dummy is 1 for the months *t-1* to *t+2*, with the managerial turnover taking place in month *t*. Expense ratio is the annual fee paid to a mutual fund over an investment in the fund. Ln(fund age) is the natural logarithm of the number of months since the inception of the fund. Ln(TNA) is the natural logarithm of the total net assets of a fund at month-end. Heteroskedasticity-robust t-statistics are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively.

months of the change. However, the interaction term of managerial turnover and PPI is insignificant, which means that there is no reaction to managerial turnover when performance in the past year has been positive. This result suggests that the significant negative result for the turnover dummy in model 4 is mainly caused by the funds that experienced negative performance. Moreover, it could also mean that the withdrawals in poorly performing funds mainly cause the significant positive result for the interaction variable in model 4. Lastly, significant results are found, but the magnitude of these results should be considered as well.

The dependent variable in the models is the percentage fund flow. The turnover dummy precisely shows the difference in flows surrounding manager changes and all other observations. The negative flows for past poorly performing funds that have been found in model 5 are rather low, with only -0.3% per month. Still, the hypothesis ($H_1$) that was constructed, which stated that pre-replacement poorly performing funds would experience improved post-replacement flows, should be rejected. The opposite is found with deteriorating flows for these funds. Moreover, no significant change in post-turnover flows was hypothesized for outperforming funds, which cannot be rejected based on model 5.

So, if a fund experienced negative performance in the past year and there is a manager change, investors withdraw money from the fund. This result is contrary to Kostovetsky and Warner (2015), who generally found flow improvements following departures of poor past performers. In that sense, it is a new and surprising result. So, Kostovetsky and Warner showed that investors found new hope that the fund would perform well in the future after a poorly performing manager was replaced. However, investors withdrawing money from a fund that has not been performing well and decides to change management is not illogical either. Both these things signal to investors that the fund is not operating optimally. Moreover, a new management team could deter new investors because they want to see the new team prove their worth first, affecting fund inflows for a certain period after turnover. Another explanation could be that some inattentive investors were unaware of the funds' poor performance in the last months. The change in management could draw their attention, leading to withdrawals once they realize the fund is performing poorly. Lastly, investors could realize that a manager change is no guarantee for a better future (Goyal & Wahal, 2008).

When looking at funds that experienced outperformance in the past year, based on model 5, investors do not react to managerial turnover. However, the significant positive interaction coefficient in model 4 remains to be explained. As described before, this might be caused by the withdrawals in poorly performing funds, or perhaps there is another reason. Maybe outperforming funds are more likely to expand their teams than to replace a manager or scale down their teams, leading to a different reaction by investors. The answers to this are hoped to be found by studying manager departures and arrivals separately. In the following subsections, an attempt will be made to further explain the results by studying team size and the different possible team changes with managerial turnover.

For the control variables, the expected results are found in both models. Higher expense ratios will negatively affect flows resulting in a lower return for the investor. Furthermore, fund age attenuates flow sensitivity, which is in line with Berk and Green (2004).

## 5.2 Team size

In Table 3, we see model 4 and model 5 run on all three subsamples. Column 1 shows the results for the sample with one up to three managers, column 2 shows the results with funds of all team sizes included, and column 3 shows the results for funds with a single manager in charge. A comparison can provide clarity on the relevance of team size for the turnover-flow relationship.

When looking at Table 3, the results of the main sample in column 1 are almost identical to the results of the sample in column 2, showing that involving teams with more than three managers does not change the results by much compared to when only teams of up to three managers were involved. Though, these two samples' results substantially differ in magnitude from those of the sample with only single managers in column 3. One thing to conclude from model 4 across all samples is that managerial turnover generally has a significant negative effect on fund flows. The investors' negative reaction is about four times as strong for individually managed funds than when all team sizes are considered. Furthermore, where the interaction between prior fund performance and managerial turnover in model 4 is significant for the samples with team-managed funds, it is not significant for individually managed funds. This insignificance means no noticeable reaction in investor flows when a manager is replaced, conditional on prior performance. However, the turnover dummy in model 5 shows that when a fund experienced negative performance in the year before turnover, it still negatively affects flows for the individually managed funds. Once again showing that it is likely that the negative reaction to turnover by investors in model 4 is mainly caused by the funds replacing a poorly performing manager. The negative flow for poorly performing funds is two to three times stronger for the individually managed funds than the samples with team management. However, this negative flow is still not large, with -0.6% per month. Another thing that attracts attention is that the expense ratio has a weaker negative effect on fund flows for individually managed funds than for team-managed funds. In conclusion, the results from Table 3 suggest that investors care more about the management of a fund for individually managed funds than for team-managed funds. Apart from that, the results are similar across the three samples. Only in magnitude, the results differ, but signs are consistent among the groups.

Model 6 has been constructed to give a more precise analysis of the effects of differences in team size. Table 4 displays the results of model 6, where the effects of different team sizes on investor flows and managerial turnover are reviewed. First, column 1 will be analyzed where the results of model 6 for the main sample can be observed. Team size is used in the regression as a categorical variable ranging from 1 to 3, simply indicating the number of named managers in a team. Since the turnover dummy is a dummy variable, we can quickly distinguish the effects

**TABLE 4**

*Effect of team size on fund flows and managerial turnover*

| | Dependent Variable = *Fund Flows* | |
|---|---|---|
| | 1 | 2 |
| | No teams above 3 | With teams above 3 |
| | Model 6 | Model 6 |
| Constant | 0.001 (1.22) | 0.004*** (7.47) |
| Turnover dummy | -0.005*** (-8.01) | -0.005*** (-8.16) |
| Team size | | |
| 2 | -0.002*** (-11.89) | -0.002*** (-13.50) |
| 3 | -0.001** (-2.51) | -0.001*** (-6.99) |
| 4 | | -0.001*** (-5.90) |
| Turnover dummy * Team size | | |
| 2 | 0.005*** (6.40) | 0.004*** (6.19) |
| 3 | 0.003*** (3.26) | 0.002** (2.47) |
| 4 | | 0.002*** (2.77) |
| Fund performance | 0.541*** (23.62) | 0.628*** (31.56) |
| Expense ratio | -0.389*** (-19.17) | -0.509*** (-36.91) |
| ln(fund age) | -0.002*** (-11.53) | -0.003*** (-20.66) |
| ln(TNA) | 0.001*** (9.29) | 0.001*** (15.00) |

Table 4 presents regression coefficient estimates from two multivariate regressions on percentage fund flow, which is the TNA percentage change from month *t*-1 to month *t*, adjusted for the return in month *t*. Model 6 is run on two different samples. In column 1, all funds with up to three managers are included, and in column 2, funds with all team sizes are included. The samples of column 1 and column 2 have 98,391 and 168,292 observations, respectively. Turnover dummy indicates the months surrounding a turnover and is 1 for the months *t-1* to *t+2*, with the managerial turnover taking place in month *t*. Team size is the number of managers in the fund, and ranges from 1 to 3 in column 1, and from 1 to 4 in column 2. If team size has a value of 4, then it has been indicated as 'team managed' in the data. Fund performance is the average monthly 4-factor alpha in the last 12 months. Expense ratio is the annual fee paid to a mutual fund over an investment in the fund. Ln(fund age) is the natural logarithm of the number of months since the inception of the fund. Ln(TNA) is the natural logarithm of the total net assets of a fund at month-end. Heteroskedasticity-robust t-statistics are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively.

of the different team sizes on fund flows when a turnover occurs compared to when there is no turnover. The individually managed funds experienced a negative reaction to managerial turnover, which was already established in Table 3. If we look at funds with a team size of two during turnover, there seems to be no reaction to turnover anymore. Interestingly, when looking at a team size of three, there is a slightly negative reaction again, but this is less than half of the negative reaction to turnover for individually managed funds. When looking at Table 4, column 2, where teams above three are included, similar results are found. A manager change negatively affects flows for teams above three managers but only about half as much as for individually managed funds. To conclude, the negative reaction to managerial turnover is most

prominent for individually managed funds and is almost zero for funds managed by two managers. However, for teams above two, there is a negative flow response about half as strong as the effect for individually managed funds. This finding partly supports the hypothesis ($H_3$) where the turnover-flow relationship was hypothesized to be stronger for funds with relatively smaller teams. It only partly supports it because it is true when a distinction is made between team-managed and individually managed funds. However, the hypothesis is rejected when comparing team sizes of two and above.

Another interesting finding in Table 4 is that team size significantly affects fund flows apart from managerial turnover. Funds that are managed by more than one person experience lower fund inflows than funds that are individually managed. This finding is contradictory to Bliss, Potter, and Schwarz (2008) and Bär, Kempf, and Ruenzi (2005), who found that team-managed mutual funds experienced higher inflows than individually managed mutual funds. However, the lower inflows for team-managed funds found in this paper are small, with -0.2% or -0.1% per month.

## 5.3 Departures and arrivals

To study the differences in departures and arrivals, model 4 and model 5 are used again. The turnover dummy variable is changed into two separate dummy variables: one indicating only departures and one indicating only arrivals. Model 4 and model 5 are then run again to study the investor response to departures and arrivals separately. The results of these tests are shown in Table 5. Column 1 displays the results of model 4 and model 5 looking at only departures, and column 2 shows the results of these models concerning only the arrivals.

Column 1, model 4, shows that manager departures negatively affect flows. However, this negative flow is neglectable with only -0.1% per month and is only significant at the 10% level. Furthermore, the positive flow-performance relationship is stronger in the months surrounding a manager departure than in the rest of the months. This same result was found in Table 3 when all manager changes were considered. Though, the additional effect is larger for departures than when all changes were considered. Model 5 shows that poorly performing funds experience negative flows surrounding a manager departure. Though, this negative flow is only -0.3% per month. Opposed to that, past outperforming funds experience a significant positive flow surrounding a manager departure. However, this positive flow is only a correction on the negative flow for poorly performing funds. Meaning that there is practically no investor response for outperforming funds surrounding departures.

**TABLE 5**

*Differences in fund flows for departures and arrivals*

| | Dependent Variable = *Fund Flows* | | | |
|---|---|---|---|---|
| | 1 | | 2 | |
| | Departures | | Arrivals | |
| | Model 4 | Model 5 | Model 4 | Model 5 |
| Constant | -0.000 | -0.003*** | -0.001 | -0.003*** |
| | (-0.67) | (-4.23) | (-0.74) | (-4.32) |
| Fund performance | 0.544*** | | 0.548*** | |
| | (23.51) | | (23.54) | |
| PPI | | 0.007*** | | 0.007*** |
| | | (33.24) | | (33.30) |
| Turnover dummy | -0.001* | -0.003*** | 0.000 | -0.001 |
| | (-1.93) | (-5.32) | (0.32) | (-1.44) |
| Fund performance | 0.681*** | | 0.412*** | |
| * Turnover dummy | (3.48) | | (2.94) | |
| PPI * Turnover | | 0.004** | | 0.001 |
| dummy | | (2.46) | | (0.96) |
| Expense ratio | -0.393*** | -0.421*** | -0.392*** | -0.421*** |
| | (-19.35) | (-20.86) | (-19.30) | (-20.82) |
| Ln(fund age) | -0.002*** | -0.002*** | -0.002*** | -0.002*** |
| | (-11.76) | (-10.91) | (-11.78) | (-10.93) |
| Ln(TNA) | 0.001*** | 0.001*** | 0.001*** | 0.001*** |
| | (10.10) | (8.73) | (10.14) | (8.76) |

Table 5 presents regression coefficient estimates from four multivariate regressions on percentage fund flow, which is the TNA percentage change from month *t*-1 to month *t*, adjusted for the return in month *t*. Model 4 and model 5 are run on the main sample. The turnover dummy from model 4 and model 5, as seen before, is now split in two. In column 1, the turnover dummy is 1 for one-for-one replacements and all departures without a new manager replacing the departing manager. In column 2, the turnover dummy is 1 for one-for-one replacements and all team expansions. Turnover dummy will take these values for the months *t-1* to *t+2*, with the managerial turnover taking place in month *t*. For all else, it takes a value of 0. Fund performance is the average monthly 4-factor alpha in the last 12 months. PPI is the positive performance indicator, returning 1 when the average 4-factor alpha of the past 12 months is positive and 0 when it is negative. Expense ratio is the annual fee paid to a mutual fund over an investment in the fund. Ln(fund age) is the natural logarithm of the number of months since the inception of the fund. Ln(TNA) is the natural logarithm of the total net assets of a fund at month-end. Heteroskedasticity-robust t-statistics are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively.

Column 2, model 4, shows that managers arriving do not affect flows. However, there is an effect to be found when looking at manager arrivals conditional on performance. There is a positive relationship between flows and pre-replacement performance. The same was observed for departing managers. Model 5 returns no significant results on manager arrivals for either poorly performing or outperforming funds, indicating that investors do not consider a manager arrival as a newsworthy event. So, there is indeed a different investor response to

departures and arrivals. The second hypothesis ($H_2$), stating that a significant fund-flow relationship is only present for funds with departing managers and not for funds with arriving managers, cannot be rejected. This information supports the decision of Kostovetsky and Warner (2015) only to include departures as managerial turnover in their research.

The main takeaways from this additional information on manager changes by splitting departures and arrivals should be discussed. The negative effect of managerial turnover on flows can be accounted to departures since there is no direct effect of arrivals on flows. However, in model 4, the interaction variable is still significant for arrivals, meaning that flows go up if a manager arrives at a fund conditional on past outperformance, and flows go down if a manager arrives at a fund conditional on past poor performance. The same result is found for departures, though with a more substantial effect. Two possible explanations for this result were discussed in section 5.1. The first stating that the positive relationship between turnover and past performance with flows could be caused by the funds expanding their teams. This explanation can still play a role in the positive interaction but is not the only reason since the positive relationship is also there for departures. The second was that the effect could, for the most part, be caused by investors withdrawing from the funds experiencing poor performance. However, the interaction variable in model 5 is now significant for departures. Meaning that fund flows are significantly higher surrounding a departure if a fund performed well compared to when the fund performed poorly, proving the positive relationship. Moreover, the turnover dummy variable in model 5 is now insignificant for arrivals, showing that there is no specific effect on flows for past poorly performing funds. So, stating that the positive relationship is primarily caused by investors withdrawing from poorly performing funds is a statement that cannot be made either. Thus, a positive relationship is found where a negative relationship between performance and the turnover-flow relationship would have been more in line with the expectations. A manager change only strengthens the positive relationship between past performance and flow, which departures or arrivals cannot explain.

Additional to the tests in Table 5, some robustness tests have been done. Firstly, the results are similar and only differ slightly in the magnitude of the coefficients if one-for-one replacements are removed from both the dummy variables. Secondly, a team reduction or team expansion could mean that one or two managers leave or join the team since the teams only go up to three people. The results are not sensitive to a different magnitude in a team change.

## 5.4 Managerial turnover and future performance

Mutual funds would only be expected to incur the costs that come with managerial turnover if they expect some improvements in flows or returns. Flows have already been analyzed, now returns will be studied. To do this, a comparison has been made for the pre-turnover and post-turnover periods. The most significant determinant of managerial turnover is expected to be performance, so the sample is split between funds that experienced negative performance (NP) and funds that experienced positive performance (PP).

Table 6 presents the results for this analysis, where the four-factor alpha and the CAPM alpha have been used as performance measures. For the PP sample, a deterioration in the fund alphas is found in the year after turnover compared to the pre-turnover year. Both the mean and median have significantly changed between the years, and this result is robust to which performance measure is used. This finding is in line with Khorana (2001) and Gallagher and Nadarajah (2004). A deterioration in post-turnover four-factor alpha is also found for the NP sample, though noticeably smaller than for the PP sample. The negative change between the pre- and post-replacement years for the NP sample opposes the most existing literature. For example, Khorana (2001) and Gallagher, Nadarajah, and Pinnuck (2006), who found

**TABLE 6**

*Performance in the year before and after managerial turnover*

| | | Year-1 | Year+1 | Change |
|---|---|---|---|---|
| 4-factor alpha | NP | -0.303 | -0.315 | -0.012*** |
| (in % per month) | | *-0.237* | *-0.248* | *-0.011**** |
| | PP | 0.165 | 0.143 | -0.022** |
| | | *0.089* | *0.078* | *-0.011** |
| CAPM alpha | NP | -0.367 | -0.369 | 0.002 |
| (in % per month) | | *-0.293* | *-0.294* | *0.001* |
| | PP | 0.181 | 0.151 | -0.030*** |
| | | *0.104* | *0.084* | *-0.020*** |

Table 6 presents the mean and median (represented in italics) performance for funds that experienced managerial turnover. The two performance measures used are the 4-factor alpha based on Carhart's 4-factor model and the CAPM alpha (1-factor alpha). NP (PP) refers to funds that experienced negative (positive) performance in the 12 months prior to the month in which managerial replacement occurred. For the 4-factor alpha analysis, NP and PP are based on the monthly 4-factor alphas, and for the CAPM alpha analysis, NP and PP are based on the monthly CAPM alphas. Year-1 is the 12-month period prior to managerial turnover. Year+1 is the 12-month period after managerial turnover. The change in mean and median levels of performance for the year before turnover and the year after turnover is presented in the last column. To test the significance of the change in mean and median, a paired *t*-test and the Wilcoxon signed rank test are used, respectively. For the 4-factor analysis, the NP sample has 15,319 observations, and the PP sample has 4,730 observations. For the CAPM alpha analysis, the NP sample has 15,244 observations, and the PP sample has 4,796 observations. *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively.

improvements in post-replacement performance for past poor performers. However, the result is only obtained for the four-factor alpha and is not robust to both performance measures. When CAPM alphas are used, there is no significant difference in performance between the pre- and post-turnover periods for the NP sample, which is in line with Kostovetsky and Warner (2015). The fourth hypothesis ($H_4$) should be rejected since the findings in Table 6 only half support the hypothesis. A deterioration in post-turnover performance was hypothesized for the PP sample, which is in line with the findings. However, an improvement in post-turnover performance was hypothesized for the NP sample, which has to be rejected.

The main reoccurring finding in this paper regarding investor flows is that investors withdraw after managerial turnover. This result was mainly obtained for the NP sample. Even though the deterioration in performance is more clearly noticeable in the PP sample, withdrawing is not an unjustified reaction for the NP sample based on Table 6. It can be concluded that investors do not make severe investment mistakes when interpreting the effects of managerial turnover.

A sidenote on the findings in this section is that even though the main finding here is that fund performance deteriorates after managerial turnover, it cannot be concluded that fund boards do not detect any improvement in post-turnover returns. They have more information on returns and can access all the trades that managers make, so they are able to use much more precise measures of performance. It can be expected that event study type research focusing on managers' trades is far more effective at finding abnormal performance than only observing fund alphas (Kothari & Warner, 2001).

# 6. Additional tests and robustness checks

Several additional tests are constructed to further examine the relationship between managerial turnover, flows, and performance. This includes tests to provide additional information as well as tests that provide robustness to the results.

First, the manager turnover dummy in model 4 and model 5 has been expanded to a period of seven months instead of the regular four months. This new dummy variable returns a value of 1 for the period of *t*-1 to *t*+5, where *t* is the month in which a manager change occurred. Model 4 and model 5 have been repeated with this new dummy. The results are similar to when the four-month dummy was used. Though, the magnitude of the effects of turnover and performance on flows is slightly smaller for all variables. The signs and significance are the same, indicating that investors do indeed respond to managerial turnover so far as six months

after the turnover occurred. Second, for all regressions in this paper, the performance of 12 months before turnover has been used as a performance measure. This period applies to the continuous variable on performance and the positive performance indicator that has been used. To test if investors possibly look further in the past than just those returns, which is not unlikely, the past 24 months prior to turnover have been used to replace the performance variables. Again, model 4 and model 5 have been repeated. All significant performance variables before are still significant when the last 24 months are considered instead of the last 12 months. This result indicates that investors do indeed take the performance for at least the last 24 months into consideration. The results differ slightly in magnitude when comparing the two performance measure timeframes but are very similar overall.

The performance measure used throughout this paper is the four-factor alpha of Carhart (1997). However, for additional robustness on the results, the CAPM alpha or the 1-factor alpha has been used in all regressions. The descriptive statistics on this variable can be found in Table 1. All the regressions on fund flows are robust to which of the two performance measures is used. There is only a slight difference in the coefficients of the variables, but the signs and significance of the variables remain the same among both performance measures. As described in section 4.4, the four-factor alphas have been subjected to the exponential decay values of Barber, Huang, and Odean (2016) to provide additional robustness. They calculated how investors weigh past returns when assessing manager skill and found a decreasing relevance of monthly returns as they get further back in time. The four-factor alphas of the past 12 months have been subjected to these exponential decay values to ensure that this exponential decay does not influence this paper's results. A new variable has been created to weigh the performance of the past 12 months, and this variable has been used in model 4 and model 5 to replace the absolute past 12 months performance variable. Again, the results with these weighted alphas are very similar to the results with the absolute alphas. The only difference is that the coefficients of performance on flow and the interaction of performance and turnover on flow are slightly higher. The coefficient of manager turnover, the signs, and the significance of the coefficients remain the same, meaning that the results do not lead to any different conclusions if an exponential decay function is used.

# 7. Conclusion and future research suggestions

This paper examines the impact of all portfolio manager changes on mutual fund flows and future fund performance for actively managed American equity funds aimed at retail investors

from 2015 to 2020. The study investigates several relationships between managerial turnover, fund flows, past fund performance, team size, and future fund performance. Studying fund flows provides an analysis of the retail investors' attention to managerial turnover. This paper used the performance of a single year prior to turnover as a proxy for voluntary or involuntary turnover. This paper is an addition to the existing literature. It is one of the first to extensively study post-turnover flows, especially on areas such as team size and splitting departures and arrivals. Moreover, some surprising new results have been found, which could provide mutual fund investors and mutual fund management boards with new information.

The empirical analysis provides proof that fund flows generally deteriorate in the year after managerial turnover. Funds have been divided in two groups to analyze the importance of past performance on post-turnover flows. A distinction has been made between funds that generated a positive and a negative average monthly alpha in the year prior to turnover. Post-replacement flows have been found to deteriorate for pre-replacement poorly performing funds, and no significant change in post-replacement flows has been detected for pre-replacement outperforming funds. The deterioration for poorly performing funds indicates that even though a fund might be performing poorly, a change in management will not convince investors to stay with the fund.

Another important finding in this paper concerns the relevance of the number of portfolio managers within a fund. The negative post-replacement flows for past poor performers are much stronger for individually managed funds than for team-managed funds. The negative flow for team-managed funds is less than half of the effect for individually managed funds or disappears altogether. Moreover, apart from managerial turnover, individually managed funds seem to gain more flows than team-managed funds. To further investigate different manager changes, departures and arrivals have been split into two groups. Again the turnover-flow relationship is investigated regarding past performance. The analysis shows that only funds with departing managers experience significant negative post-replacement flows for pre-replacement poor performers. The same result is not found for new managers arriving at a fund.

Additional to the study on post-replacement flows, post-replacement performance has been studied. The main finding on post-replacement flows is that fund flows deteriorate for pre-replacement poorly performing funds. When looking at the post-replacement performance of poorly performing funds, a deterioration in a funds' four-factor alpha has been found. However, this result is not robust to the use of CAPM alphas, where no significant change in performance is found. Still, it can be concluded that the decreasing post-replacement flows for poorly performing funds are not unjustified since fund performance either deteriorates or does not

change. For funds that generated a positive alpha in the pre-replacement year, fund performance deteriorates in the post-replacement year. To conclude, fund flows and fund performance are both found to deteriorate or stay the same after managerial turnover. This result suggests that fund boards do not have short-term flow or performance improvement incentives to change managers.

Lastly, some recommendations for future research will be discussed. This paper found some new surprising results that opposed some of the existing literature. For this paper, a fairly short and recent period was studied. An interesting approach for future research could be to study the same effects over a longer period which might provide insight into the causes of these different results. Perhaps investors have changed their investment allocation approach over time, or maybe it has not changed at all. Moreover, this paper found some new results on the effects of team size during managerial turnover. These effects concern all manager changes. However, the turnover effects found in this paper are established to be stronger for departures. An interesting next step would be to dive deeper into this relationship between managerial turnover and team size, but this time only study the departures. Another possible addition would be adding the previous track records of incoming managers in the models. A distinction could then be made between outperforming managers and poorly performing managers arriving at a fund, which could lead to a different investor response. Unfortunately, the data used in this paper did not allow for such an analysis. Finally, an attempt could be made to further expand the models used in this paper with other variables.

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# Appendix

**TABLE 7**

*Descriptive statistics for the second and third mutual fund sample*

| Variable | Mean<br>1 | Std. Dev.<br>2 | 10%<br>3 | Median<br>4 | 90%<br>5 |
|---|---|---|---|---|---|
| *Panel A: Sample with all funds* | | | | | |
| Percentage fund flow | -0.955% | 2.515% | -3.074% | -0.852% | 1.059% |
| Fund size ($mil) | 965.60 | 2536.14 | 32.20 | 204.30 | 1954.00 |
| Ln fund size ($mil) | 5.459 | 1.589 | 3.472 | 5.320 | 7.578 |
| Fund age (months) | 225.28 | 125.07 | 111.00 | 204.00 | 343.00 |
| Ln fund age (months) | 2.786 | 0.483 | 2.197 | 2.833 | 3.332 |
| Expense ratio | 1.23% | 0.48% | 0.57% | 1.21% | 1.91% |
| Team size | 2.422 | 1.128 | 1 | 2 | 4 |
| 4-factor alpha | -0.167% | 0.414% | -0.575% | -0.145% | 0.178% |
| 4-factor alpha (*t*-12 to *t*-1) | -0.159% | 0.373% | -0.534% | -0.135% | 0.150% |
| 4-factor alpha (*t*-24 to *t*-1) | -0.150% | 0.334% | -0.488% | -0.124% | 0.132% |
| CAPM alpha | -0.195% | 0.454% | -0.674% | -0.159% | 0.221% |
| CAPM alpha (*t*-12 to *t*-1) | -0.188% | 0.410% | -0.604% | -0.151% | 0.174% |
| PPI | 0.249 | 0.432 | 0 | 0 | 1 |
| Volatility (*t*-12 to *t*-1) | 3.321% | 1.673% | 1.390% | 3.104% | 5.368% |
| *Panel B: Sample with only individually managed funds* | | | | | |
| Percentage fund flow | -0.775% | 2.731% | -2.973% | -0.773% | 1.160% |
| Fund size ($mil) | 1482.48 | 4358.75 | 35.90 | 243.70 | 3121.10 |
| Ln fund size ($mil) | 5.664 | 1.693 | 3.581 | 5.496 | 8.776 |
| Fund age (months) | 249.49 | 122.25 | 127.00 | 230.00 | 385.00 |
| Ln fund age (months) | 2.905 | 0.464 | 2.303 | 2.944 | 3.466 |
| Expense ratio | 1.22% | 0.45% | 0.72% | 1.13% | 1.88% |
| Team size | 1 | 0 | 1 | 1 | 1 |
| 4-factor alpha | -0.126% | 0.528% | -0.628% | -0.124% | 0.322% |
| 4-factor alpha (*t*-12 to *t*-1) | -0.115% | 0.484% | -0.587% | -0.110% | 0.290% |
| 4-factor alpha (*t*-24 to *t*-1) | -0.108% | 0.442% | -0.527% | -0.096% | 0.263% |
| CAPM alpha | -0.163% | 0.551% | -0.713% | -0.150% | 0.387% |
| CAPM alpha (*t*-12 to *t*-1) | -0.157% | 0.508% | -0.638% | -0.140% | 0.344% |
| PPI | 0.334 | 0.472 | 0 | 0 | 1 |
| Volatility (*t*-12 to *t*-1) | 3.765% | 1.793% | 1.810% | 3.513% | 5.901% |

Table 7 presents summary statistics for the major fund-level variables and the performance evaluation variables from the second and third sample used in this paper. Panel A presents the descriptive statistics for the second sample, where all funds are included (including teams over three people), and contains 168,282 observations. Panel B presents the descriptive statistics for the third sample, where only individually managed funds are included, and contains 19,712 observations. All statistics are across fund-month observations from January 2015 to December 2019. Percentage fund flow is the total net assets (TNA) percentage change from month *t*-1 to *t* adjusted for the monthly return in month *t.* Fund size is the market value of the TNA at the end of the month, and Ln fund size is the natural logarithm of Fund size. Fund age is the number of months since the inception of the fund, and Ln fund age is the natural logarithm of fund age. Expense ratio is the annual fee paid to a mutual fund over your investment. Team size is the number of named managers in the fund. All alpha variables are calculated using a rolling window regression using the monthly return data and Fama and French factors of the prior two years. 4-factor alpha (*t*-12 to *t*-1) and 4-factor alpha (*t*-24 to *t*-1) are the average monthly 4-factor alpha in the last 12 months and the last 24 months, respectively. CAPM alpha (1-factor alpha) (*t*-12 to *t*-1) is the average monthly 4-factor alpha in the last 12 months. PPI is the positive performance indicator, which is a dummy variable returning 1 when 4-factor alpha (*t*-12 to *t*-1) is positive and 0 when it is negative. Volatility (*t*-12 to *t*-1) is the standard deviation of a fund's net returns in the last 12 months. Percentage fund flow, fund size variables, fund age variables, and expense ratio are winsorized at the 1% and 99% level to protect against data inconsistencies.