Portfolio Performance, Discount Dynamics, and the Turnover of Closed-End Fund Managers*

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Abstract

This paper analyzes the time-series dynamics of closed-end fund discounts and their relation to portfolio performance and manager turnover. We find that a fund underperforms its peer group prior to manager replacement, but improves afterwards. Further, we show that discount changes reflect investor learning about fund manager skills, as well as investor anticipation of an impending manager replacement. Specifically, prior to replacement, the discount initially increases as fund performance worsens, then stops responding to further poor performance. For domestic equity funds, the peer-adjusted discount first increases by about 5%, then decreases by about 3% by the time of replacement. We also find that discount changes reflect past and forecast future portfolio performance among funds without manager replacements. Overall, our results are consistent with a significant component in closed-end fund discounts being related to manager talent.

1 Introduction

The deviation of closed-end fund share prices from net asset values (NAVs) represents a major puzzle in finance since, in the absence of frictions, such deviations violate the law of one price. There have been numerous attempts to explain closed-end fund discounts or premia.[1] One important explanation builds on the shortfall of the portfolio manager's ability relative to the management fees charged. Surprisingly, with the notable exception of Chay and Trzcinka (1999), past studies have failed to find a significant correlation between fund performance and discounts.

Theoretically, the relation between discounts and managerial ability should be strong in the absence of manager change. For example, poor performance will lead to a downward revision of investor perception of managerial ability, thus leading to a larger discount. However, if managers are frequently replaced, this relation will be weakened. Thus, the empirical relation between managerial skill and closed-end fund discounts will crucially depend on whether underperforming managers are entrenched and outperforming managers are retained.

This paper provides the first comprehensive empirical investigation of the relation between discount changes, portfolio performance, and manager turnover. Specifically we provide evidence on the following questions. Are underperforming closed-end fund managers replaced? How are discounts and their dynamics related to manager replacement? Is there a significant relation between performance and discounts, after controlling for manager turnover?

To conduct our study, we assemble a database of share prices and NAVs, along with the date of manager replacement events, for all U.S. closed-end funds in existence from 1985 to 2006. Using this dataset, we first study the fund's portfolio performance (NAV returns) before and after manager replacement. We find that past peer-adjusted NAV returns help to predict the replacement of closed-end fund managers. Specifically, replaced managers underperform their peer groups during the two-year event window prior to re-

[1] See Dimson and Minio-Paluello (2002) for an excellent survey of this literature.

placement. Following manager replacement, fund performance improves significantly for all fund categories except taxable bond funds. This result confirms that the average fund in our sample exhibits effective governance in that underperforming fund managers are replaced. In a world with rational expectations, this implies that poor performance will not necessarily be accompanied by an increase in the discount, since investors may anticipate a possible manager change.

We next examine the dynamics of the discount surrounding manager replacement events, and find an intriguing result: the peer-adjusted discount widens initially, then decreases prior to replacement. Specifically, among domestic equity funds, the discount first grows by about 5%, then decreases by approximately 3%, despite continuing poor NAV performance before replacement. This finding suggests that investors, observing poor performance, initially capitalize their beliefs about the (poor) ability of a fund manager into the stock price. However, the market eventually infers from performance (or learns from other sources) that this manager will likely be replaced – thus, the discount stops responding to poor NAV returns.

After decomposing the sample, we find that this hump-shaped pattern of discounts prior to manager replacement is mainly driven by equity funds. For bond funds, peer-adjusted discounts continue to increase until the replacement date, indicating that the replacement anticipation effect is weaker for such funds. This is consistent with our result that bond fund performance does not improve substantially after manager replacement.

We add further evidence by exploring the determinants of manager replacement in a logit regression setting that includes, as explanatory variables, NAV returns, discount returns (returns to closed-end fund shareholders due to changes in discounts), and several control variables. We find that, for equity funds, while the two-year lagged discount return helps to predict manager replacement, the one-year lagged discount return does not. Consistent with the above-mentioned pattern of discount changes preceding the replacement event, this finding further supports that discount changes reflect not only the

assessment of investors about fund manager ability, but also the expectation of investors regarding whether the manager will be replaced.

Our final tests focus on the relation between discount changes and NAV returns, accounting for the influence of manager replacement events. Specifically, we examine this relation separately for funds experiencing a manager replacement event and funds not experiencing such an event. In a Granger causality setting, we find that lagged peer-adjusted NAV returns predict peer-adjusted discount returns with a positive coefficient, indicating that the discount responds to information about manager ability reflected in prior portfolio performance, which is consistent with the predictions of Berk and Stanton (2007). In addition, we find that lagged peer-adjusted discount returns predict peer-adjusted NAV returns, indicating that discounts reflect rational expectations about manager ability.

Interestingly, we find that these relations weaken substantially during a year with a manager replacement event. While there is still weak evidence that discount returns forecast future NAV performance, lagged NAV returns do not predict discount returns. This result again suggests that when fund investors anticipate or observe a manager replacement, they disregard the past NAV performance (of the replaced manager) when setting the discount.

Overall, our results are consistent with a significant component in closed-end fund discounts being related to manager talent. The key to our study is that we account for manager replacement events when analyzing the dynamics of the discount. In addition, in contrast to most previous studies, we focus on the change of discounts instead of the discount level itself, which may be affected by many fund-specific factors.

Our paper is most closely related to the managerial performance theory of closed-end fund discounts (Ferguson and Leistikow (2001), Ross (2002), Berk and Stanton (2007)), which argues that the economic value of a closed-end fund is lower than the value of the underlying assets if managerial ability is not sufficient to offset management expenses. While intuitively appealing, this theory has not found much empirical support. For example, Malkiel (1977) finds no significant relation between fund performance and discount

levels. Thompson (1978) finds that fund discounts are positively related to future returns of fund stocks. Pontiff (1995) further shows that this relation is mainly driven by mean-reverting discounts. More surprisingly, Lee, Shleifer, and Thaler (1990) report that the NAV performance of funds trading at larger discounts is higher than those with smaller discounts. An exception that supports the managerial performance theory is Chay and Trzcinka (1999), who show that the future NAV return of funds selling at a discount is lower than that of funds selling at a premium.

Our paper is also related to the agency theory of the closed-end fund discount. Barclay, Holderness, and Pontiff (1993) find that closed-end fund discounts are positively related to the aggregate fund shares owned by the management and blockholders friendly to the management. They also provide evidence showing that the management and friendly blockholders receive private benefits from the continuation of the fund, which induce them to veto open-ending proposals. Coles, Suay, and Woodbury (2000) find that fund discounts are lower when the compensation of the fund advisor is more sensitive to fund performance. Del Guercio, Dann, and Partch (2003) find that board characteristics that proxy for board independence are associated with lower expense ratios and value-enhancing restructurings, but do not find any direct relation between board characteristics and fund discounts. Our paper differs from these studies by examining the *change* in discounts around an important corporate governance event – the replacement of the portfolio manager.

Several previous studies have examined the determinants and impacts of manager replacement in open-end funds (Khorana (1996), Khorana (2001), Chevalier and Ellison (1999), Hu, Hall, and Harvey (2000), Ding and Wermers (2006), Jin and Scherbina (2006)). These studies show that manager replacement tends to be preceded by poor performance and followed by improved performance. However, these results do not necessarily translate to the closed-end fund market. In the case of open-end funds, as shown by Dangl, Wu, and Zechner (forthcoming), the response of investor flows to fund perfor-

mance generates strong incentives for the fund management company to fire underperforming managers. Such a mechanism does not exist in the closed-end fund market.

The rest of this paper is structured as follows. Section 2 develops the main hypotheses that we test. Section 3 describes our database. Section 4 presents the patterns of fund performance, discounts, and NAV return volatility surrounding manager replacement. Section 5 uses a logit model to investigate the determinants of manager replacement. Section 6 examines the relation between NAV performance and discount changes by estimating a dynamic panel data model. Section 7 concludes.

2 Definitions and Hypotheses

2.1 Definitions

To add clarity to our hypotheses to follow, we first introduce several definitions. We call the return on the shares of a closed-end fund "stock return" and call the return on the fund's underlying assets "NAV-return", denoted by R_t^S and R_t^N, respectively. All the returns are continuously compounded, so that a multi-period return is the sum of returns in each constituent period. Formally, the period-t returns are calculated as follows,

$$R_t^S \equiv \ln(P_t + DIST_t) - \ln(P_{t-1}) \tag{1}$$

$$R_t^N \equiv \ln \frac{NAV_t + DIST_t}{1 - f_t} - \ln(NAV_{t-1}) \tag{2}$$

where P_t is the per-share market price of the closed-end fund at the end of period t, NAV_t is the per-share net asset value (after expenses, dividends and capital gains distributions), $DIST_t$ is the cash distribution (capital gains and dividends) in period t, and f_t is the per-period expense ratio. Our definition of NAV-return captures the total return generated by the fund's portfolio, gross of fees paid to the management company. This can be viewed as an accounting measure of the manager's performance.

We define discount at the end of period t as

$$D_t \equiv \frac{NAV_t - P_t}{NAV_t}. \tag{3}$$

A negative discount means that a fund trades at a premium. To exclude the influence of the dividend payment on the level of the discount at the ex-dividend day, we also introduce an alternative definition of discount, the cum-dividend discount:

$$D_t^{cum} \equiv \frac{NAV_t - P_t}{NAV_t + DIST_t}. \tag{4}$$

This definition recognizes the following fact: at the ex-dividend day, *ceteris paribus*, the fund's stock price and NAV should drop by the same amount, i.e., $DIST_t$, but the resulting change in the discount is purely mechanical and has no effect on the return to shareholders.[2]

A combination of the two discounts defined above can be used to measure the return to closed-end fund investors caused by the change of discounts. We call this term "discount return" and define it as follows,

$$R_t^D \equiv \ln(1 - D_t^{cum}) - \ln(1 - D_{t-1}). \tag{5}$$

[2]Consider a simple example: Suppose that in period $t-1$, a fund with a NAV of \$10 trades at the price of \$8, i.e., with a discount of 20%. In period t it pays a dividend of \$2, and both its stock price and its NAV per share decrease by \$2 after the dividend payment. This will mechanically result in an end-of-period discount of 25% according to the normal definition. Introducing the cum-dividend discount allows us to decompose stock returns into discount returns and NAV returns more precisely. Nevertheless, our results remain largely unchanged without this dividend adjustment.

It is easy to see that the stock return in each period is simply the sum of NAV-return and discount return, minus the expense ratio.[3] By definition, we have

$$\begin{aligned} R_t^S &= \ln[(NAV_t + DIST_t)(1 - D_t^{cum})] - \ln[NAV_{t-1}(1 - D_{t-1})] \\ &= [\ln(NAV_t + DIST_t) - \ln(NAV_{t-1})] + [\ln(1 - D_t^{cum}) - \ln(1 - D_{t-1})] \\ &= \ln(1 - f_t) + R_t^N + R_t^D. \end{aligned}$$

Therefore, if we ignore the management fees and transaction costs, the discount return can be interpreted as the return from investing in the shares of the closed-end fund, financed by short-selling the assets held by the fund.

2.2 Hypotheses

To motivate our empirical tests, we formulate hypotheses concerning the relations between the NAV return, discount return, and manager turnover. Since the NAV-return is a direct measure of managerial performance, if governance mechanisms are effective, then one would expect that poor NAV-returns will lead to a manager replacement, which in turn will be followed by an improvement in NAV-returns. In contrast, if the replacement of managers happens purely for exogenous reasons (e.g., retirement), we would observe no relation between manager replacement and NAV-performance. Therefore our first null and alternative hypotheses are:

Null Hypothesis I: *Past and future NAV returns are uncorrelated with manager replacement events.*

Alternative Hypothesis Ia (Effective Governance): *Past NAV-returns are negatively correlated with the probability of manager replacement, and NAV-returns improve after manager replacement.*

We now turn to the relation between the discount dynamics and manager replacement. In a rational world, the discount/premium capitalizes the fund's future under- or

[3] Note that $\ln(1 - f_t) \approx -f_t$ when f_t is small.

overperformance, as modeled, for example, by Berk and Stanton (2007). Consider a fund manager with known ability and fixed replacement date. Then, if we assume that the new manager is not expected to exhibit systematic over- or underperformance after fees, the fund's discount or premium will monotonically converge to zero as the known replacement date approaches.[4] We will refer to this effect as the "replacement anticipation effect".

Now suppose that the current manager's ability is unknown and investors update their beliefs using realized NAV performance. In this case, poor NAV performance would result in a downward revision in the market's view of managerial ability, leading to an increase in the discount. We will refer to this effect as the "ability learning effect". Now, the discount does not necessarily converge monotonically to zero as the replacement date is reached. While the replacement anticipation effect always tends to move the discount towards zero, the ability learning effect can either increase or decrease the discount, depending on whether the observed NAV performance constitutes a positive or a negative surprise. However, the learning effect becomes less influential as the time to replacement becomes shorter. In the limit, as manager replacement approaches, learning about the current manager's ability becomes irrelevant.

Now consider the more realistic case where managerial replacement is uncertain and is chosen endogenously by the management company, as postulated in Hypothesis Ia, i.e., poor NAV performance leads to a higher probability of manager replacement. In this case, the learning effect resulting from underperformance will be further mitigated by a shortening of the expected time to manager replacement.

We expect the ability learning effect to dominate when replacement is only a remote possibility, but the replacement anticipation effect to dominate as the expected time to manager turnover shortens. This results in a non-monotonic pattern of discounts - first rising and then falling - prior to manager replacement. By contrast, if the discount does

[4]Note that the costs associated with a manager replacement are typically borne by the management company, and should therefore not be reflected in the fund's share price.

not reflect managerial ability, then there will be no systematic pattern in discounts prior to manager replacement.

Null Hypothesis II: *Changes in discount levels are unrelated to manager replacement.*

Alternative Hypothesis IIa (Learning and Anticipation Effects): *Due to the time-varying ability learning and replacement anticipation effects, discount levels first increase, and then decrease prior to manager replacement.*

Our discussion above also implies that, in a rational world, the dynamic relation between the discount return, as defined by Equation (5), and the NAV return will be influenced by a manager replacement event. In the absence of manager replacement, there should be a positive relation between past NAV-returns and current discount returns, because a high NAV-return leads to an increase in the market's assessment of managerial ability (the ability learning effect). In turn, there will also be a positive relationship between current discount returns and future NAV returns. For example, if investors expect future NAV returns to be high, then the current discount will decrease. If investors' expectations about future NAV returns are unbiased, then discount returns will forecast future NAV returns. We refer to this effect as the "rational expectations effect".

However, both relations are weakened in the periods immediately surrounding a manager turnover. If a manager replacement has just occurred, or is imminent, then the past portfolio performance will provide less information about future performance. Thus, the learning effect may disappear. At the same time, future performance for funds undergoing a manager turnover may be more difficult to predict, thus weakening the rational expectation effect.

By contrast, if discounts are purely driven by investor sentiment, then there will be no relation between discount changes and NAV performance even in the absence of manager replacement.

Null Hypothesis III: *Discount returns and NAV returns do not forecast each other, even in the absence of manager replacement.*

Alternative Hypothesis IIIa (Dynamic Performance-Discount Relation): *In the absence of manager replacement, discount returns forecast NAV returns, and vice versa; in the periods surrounding manager replacement, the dynamic relation between these two variables becomes weaker.*

3 Data and summary statistics

3.1 Sample selection procedure

We examine the returns and characteristics of the universe of U.S. closed-end funds over the period from January 1985 to June 2006. This database is constructed from two sources. First, we obtain the investment objective, weekly share price and net asset value, monthly total net assets, annual expense ratio and turnover rate, and daily information on distributions from Lipper Inc., a leading provider of mutual fund data. The weekly stock return, NAV-return and discount return are then calculated according to definitions (1), (2), and (5), respectively. The annual expense ratio is divided by 52 before it is used to calculate the weekly pre-expense NAV-return.[5]

Second, fund manager information is obtained from Morningstar Inc.. These data include the start- and end-dates of each manager for each closed-end fund. We link together the Lipper fund data with the Morningstar manager data using fund ticker symbols, fund names, and other fund information, such as advisor identity. The Morningstar manager database covers the period from January 1985 to June 2004, while the Lipper database covers the period from January 1985 to June 2006, thus allowing us to examine fund performance for two years following all manager replacements through June 2004. Both the Lipper and the Morningstar databases cover dead funds as well as active funds, therefore, survivorship bias is not a concern for our study.

We adopt the following sample selection procedure. We start with all funds in the

[5]When a fund's expense ratio for a specific year is missing, we use the average expense ratio of that fund during the entire sample period to calculate its NAV return.

Lipper NAV and price database. First, we exclude funds without distribution data since it is impossible to calculate their returns; second, we exclude funds having fewer than 104 observations (two years) of weekly NAV or discount returns; and third, we exclude all convertible, warrant, preferred stock, and international debt funds since there are few such funds. We are left with 644 Lipper funds after these three steps. Finally, we exclude funds that cannot be matched to the Morningstar manager database. Our final sample consists of 579 funds, each with, on average, 594 weekly return observations.[6] Among them, 156 cease to exist before the end of June 2006.

[Table 1 about here.]

According to the Lipper classification system, the 579 funds in our final sample are classified into four broad categories: domestic equity, international equity, taxable bond, and municipal bond. Each category is further divided into several sub-groups according to the investment objective of funds. Table 1 displays the distribution of the funds across categories, as well as across investment objectives.

Our sample shows that the US closed-end fund market is dominated by bond funds: municipal bond funds constitute more than one half (312) of our sample, while domestic equity (60) and international equity funds (70) together constitute less than one quarter. These features are in sharp contrast to the UK, where all closed-end funds are equity funds. The number of funds also differs substantially across investment objectives, ranging from 3 (Minnesota Municipal Debt Funds) to 59 (General Muni Debt Funds (Leveraged)).

[Table 2 about here.]

3.2 Fund characteristics

Table 2 summarizes various fund characteristics for five sample years, 1985, 1990, 1995, 2000, 2005, as well as for the entire sample period. For each sample year, we report the

[6]The 65 unmatched funds do not display any systematic differences from the remaining 579 in returns, discount levels, or other fund characteristics.

total number of funds as well as the average size (measured by total net assets), discount level, expense ratio, NAV return, discount return, and stock return. Statistics for the entire sample period are averages over all fund-years.

Some notable features emerge from the table. For instance, equity funds generally have a higher expense ratio and a higher discount than bond funds. This is consistent with Ross (2002), who attributes the discount to the present value of expenses. Furthermore, although discount returns over the entire period are close to zero for all types of funds, they generate big losses or gains for shareholders during shorter periods. For example, international equity funds generated an average discount return of -28.12% during 1990. Even with bond funds, discount changes can have a significant impact – the average discount return for taxable bond funds is over 11% during 2000. These findings highlight the importance of discount changes on investor wealth.

3.3 Manager characteristics

Table 3 summarizes manager characteristics for our funds at the end of 1985, 1990, 1995, 2000, as well as at the end of June 2004. The last column reports average manager characteristics measured across all fund-years from 1985 to 2004. Panel A reports the average manager tenure, in years, for each category and for the entire sample. For a team-managed fund, manager tenure is measured as the longest tenure of all active managers. Note that managers of domestic equity funds, on average, have a longer tenure than managers in other fund categories, indicating that managers in this category may be more entrenched. The table also shows that manager tenure in 1990 and 1995 is substantially shorter than that in the other sample years. This is because many new funds were launched between 1985 and 1995, as one can see from the number of funds reported in Table 2.

Panel B reports the average size of the management team, i.e., the average number of managers associated with a specific fund. The panel shows that taxable bond funds tend to have a larger management team than other funds, indicating that the impact of replacing a single manager may be less significant than for other categories. There is also a tendency

toward larger management teams over time. For example, from 1985 to 2004, the average number of managers for each domestic equity fund has grown steadily from 1.08 to 1.86. Massa, Reuter, and Zitzewitz (2006) document a similar trend in open-end fund markets.

Besides the fact that one fund may have more than one portfolio manager, it is not unusual to observe a manager to be simultaneously involved in the management of several funds. Panel C of Table 3 reports the average number of funds, including open-end funds, simultaneously managed by a closed-end fund manager, either independently or jointly with other managers. The table shows that managers of bond funds, especially municipal bond funds, tend to simultaneously manage a larger number of funds. This implies that manager replacement in the bond fund sector may be more difficult to predict since it depends on performance across a larger number of funds.

[Table 3 about here.]

3.4 Manager replacement sample

We now present summary statistics for our manager replacement sample. We define manager replacement as occurring when at least one of the managers with the longest tenure with a given fund is replaced by a new manager(s).[7] To ensure that a shift in management actually happens, the new manager(s) must join the fund during a window starting 12 weeks before and ending 12 weeks after the replaced manager(s) leaves. For a manager replacement to be included in our event sample, it has to meet several additional criteria: first, at least one of the replaced managers should have a tenure longer than two years (i.e., 104 weeks) with the current fund; in addition, at least 40 weekly return observations must be available during each of the two years prior to the replacement. These conditions are imposed since we wish to build a pre-replacement record for the replaced manager(s). 103 replacement events fail to satisfy these criteria and are thus excluded. We further exclude 4 replacement events that occurred within one year since the last event, as well as

[7] We have also explored alternative definitions of manager replacement. For example, we have defined manager replacement as occurring if at least half of the management team is replaced. The results remain qualitatively unchanged and are available upon request.

5 extreme observations.[8] Our final sample consists of 286 manager replacement events, which involve 166 managers since the same manager can be replaced at multiple funds. These events occur across a total of 214 funds. Panel A of Table 4 displays the distribution of the 286 manager replacement events across fund categories and periods.

Since our definition of manager replacement requires that at least one new manager be appointed to manage the fund, it automatically excludes the case where a manager loses his job due to the termination of his fund. Although the termination of underperforming funds represents another important mechanism to discipline fund managers, it is well known that the stock price of closed-end funds tends to converge to NAV at termination. We exclude fund terminations because we do not want this predictable discount movement, which has nothing to do with expected future managerial performance, to contaminate the pre-replacement discount dynamics.[9]

[Table 4 about here.]

4 Fund performance, volatility and discounts surrounding manager replacement events

Both Alternative Hypotheses IIa and IIIa predict that manager replacement has an impact on discount dynamics. These predictions rely on the premise that fund managers have an effect on the performance of their fund portfolios (Alternative Hypothesis Ia). To establish this, we analyze the pattern of NAV returns and discounts surrounding manager replacement events.

We choose an event window of four years centered on the event date (week 0). We measure the abnormal return for an event fund as the difference between the return of the event fund and the average return of a peer group. This peer group consists of all

[8] The two-year pre-replacement NAV return (continuously compounded) is lower than -100% for these extreme events. Four of them occurred among Eastern Asian funds after the 1997-1998 Asian financial crisis; another one occurred in an internet fund in 2002.

[9] In our sample of 286 replacement events, only 12 of them are followed by a fund termination within two years. In unreported tests, we find that the effect of these fund terminations on our results is negligible.

funds with the same investment objective that do not experience a manager replacement (as defined in section 3.4) during the same four-year window.[10]

We plot in Panel A of Figure 1 the average peer-adjusted discount level, as well as the cumulative peer-adjusted NAV return and stock return over the four-year event window for the 286 manager replacement events. There are a couple of interesting patterns reflected in this figure. First, the cumulative peer-adjusted NAV-return and stock return steadily decrease prior to manager replacement. At the time of replacement, the cumulative peer-adjusted NAV return is about -2.5 percent, while the cumulative peer-adjusted stock return is about -4 percent. Given that more than two-thirds of the replacement events occur among bond funds, this underperformance is quite remarkable. Second, the deterioration of fund performance stops shortly after the manager replacement; during the first year following manager replacement, event funds even seem to outperform their peers. These patterns conflict with the null Hypothesis I and lend support to the alternative Effective Governance Hypothesis Ia.

Third, the peer-adjusted discount level exhibits an interesting pattern. It starts at about -1%, then grows to roughly 0.5% during the first 1.5 years of the event window. It then fluctuates around this level for the remainder of the event window. This pattern is consistent with the presence of two competing effects before a manager replacement (Alternative Hypothesis IIa). On one hand, investors are learning about the poor skills of the manager (ability learning effect); on the other hand, investors are anticipating that the manager is likely to be replaced (replacement anticipation effect). The pattern shown in Figure 1 is consistent with a dominant role for the first effect during the early weeks of the event window, and an increasingly important role for the second effect during the weeks immediately prior to replacement.

There are two potential reasons for the stronger replacement anticipation effect during year -1. First, as the fund continues to underperform its peers, and investors gather

[10]There are 19 replacement events in which such a peer group is not available. For these cases we use funds belonging to the same broad fund category that do not experience a manager replacement in the four-year period to construct the peer group. Furthermore, we assume that there is no manager replacement in any fund during the period from July 2004 and June 2006 when constructing the peer group.

further negative information about managerial ability, investors become increasingly confident that the manager will be replaced. Second, it is possible that the market already knows during year -1 that the manager will be replaced with certainty. Our data identifies the actual manager replacement date but not the exact date of the disclosure of the replacement to the market, which may substantially precede the actual replacement date.

[Figure 1 about here.]

Figure 2 shows results for each fund category: domestic equity, international equity, taxable bond and municipal bond. Similar to the results in Panel A of Figure 1, the cumulative peer-adjusted NAV return and stock return are negative before the manager replacement event for each fund category, indicating that the event funds are underperforming their peer groups. Interestingly, the magnitude of the underperformance of equity funds is much greater than that of bond funds. For example, domestic equity event funds underperform by about 7% by week 0, while municipal bond event funds underperform by only about 1%. After manager replacement, event funds within all categories except taxable bond outperform their peers – this is further evidence supporting the Effective Governance Hypothesis (Ia). Taxable bond event funds continue to underperform their peers following manager replacement. This may be due to the fact that funds within this category tend to have a larger management team, so replacement of a single manager has a less noticeable impact.[11]

Notably, the peer-adjusted discount level in both equity categories shows a clear pattern of first rising, then falling before manager replacement, again illustrating the relative strength of the ability learning effect and the replacement anticipation effect over time. In contrast, for both bond fund categories, the discount steadily increases before manager replacement, indicating that the replacement anticipation effect is relatively weak. Consistent with the continuing underperformance of taxable bond event funds after manager replacement, their discount level continues to rise after week 0. Note also that the

[11] Among the subsample of 43 taxable bond fund events where the entire team is replaced, we find that the post-replacement NAV performance does improve.

magnitude of the discount change prior to manager replacement is much larger for equity funds than for bond funds, indicating a larger role for equity managers in generating fund performance. Specifically, the initial increase in the discount is about 5% for domestic equity funds, which is large relative to the average level of the discount among this type of funds (8% as reported in Table 2).

[Figure 2 about here.]

[Figure 3 about here.]

To provide further evidence on the importance of manager replacement on a fund's operation, we also examine the portfolio volatility of event funds. Panel B of Figure 1 plots the peer-adjusted annualized NAV return volatility, measured over a trailing window of 52 weeks. Clearly, the volatility drops prior to the replacement event, then rises. This indicates that the replaced manager may choose or be forced to abandon his unsuccessful active strategy, and that the new manager implements a new active strategy upon taking control of the fund. Figure 3 shows patterns in volatility for each fund category. The patterns across the categories are generally consistent with that of the overall sample. Further, the v-shaped volatility pattern is much more pronounced in the two equity fund categories, indicating again that manager replacement impacts the portfolio strategy to a much larger degree in these categories.

To test whether the differences between event funds and peer groups are statistically significant, we examine four subperiods surrounding the event date (week 0): weeks -104 to -53 (year -2), -52 to -1 (year -1), +1 to +52 (year +1), and +53 to +104 (year +2). For each event fund, we calculate peer-adjusted NAV-returns, discount returns and stock returns during each year. Funds with fewer than 40 weekly return observations during a specific year are excluded from that period.

Panel A of Table 5 reports the resulting measures, as well as the t-statistics, averaged across all 286 replacement events in our sample.[12] The last two columns report the aver-

[12]The t-statistics are based on robust standard errors that allow for clustering of error terms at the manager level. This is necessary because performance of funds managed by the same manager may be correlated.

age difference between year +1 and year -1 as well as between year +2 and year -1. The results confirm the statistical significance of the patterns illustrated in Figure 1. Specifically, event funds substantially underperform their peers during year -1 in NAV returns and during year -2 in discount returns. These two return components lead to significant underperformance in the stock return during both years. Note that both the NAV return and the stock return significantly improve from year -1 to year +1 (as shown in the column labeled "+1 vs -1"). Panels B through E show results for individual fund categories. The patterns in NAV, discount and stock returns are similar to those of the overall sample, although significance levels are lower due to smaller sample sizes. As depicted in Figure 2, the equity fund categories show more dramatic NAV underperformance prior to manager replacement than bond fund categories.

Panel A of Table 6 reports the peer-adjusted discount level and NAV return volatility measured at the beginning and end of each year. It further confirms the patterns shown in panel B of Figure 1. The discount for event funds starts at a level significantly lower than that of its peers, then increases to a level that is slightly higher (though not significant). In addition, the volatility drops to a level that is significantly lower than that of its peers by the time of manager replacement, then increases significantly by week 104. Panels B through E provide further information for the discount levels and the volatility patterns for each fund category. For the two equity categories, the peer adjusted discount level climbs to a statistically significant level of about 3% by week -53. Also for these categories, annualized peer adjusted volatility rises by roughly 2%, which is statistically significant, during the two years following manager replacement (see the column labeled "104 vs -1").

[Table 5 about here.]

[Table 6 about here.]

Overall, our simple event statistics presented so far provide support for the Effective Governance Hypothesis. NAV performance prior to a management replacement is substantially lower than that of peer funds, whereas this performance improves once new

managers are employed. The results also provide supporting evidence for the existence of the ability learning effect and the replacement anticipation effect, and show the relative strength of each effect during different periods relative to the manager replacement event. Specifically, during early periods, poor NAV returns are accompanied by increasing discounts, indicating the dominance of the ability learning effect. During the periods immediately preceding a manager replacement, the discount level actually drops for equity funds despite poor NAV performance, indicating the dominance of the replacement anticipation effect.

5 The determinants of manager replacement

We now examine in a multivariate context how NAV returns and discount returns are related to future manager replacements, using a logit regression model. To implement the logit regression, we construct a control sample as follows: for any given year t (t=1987, 1988, ..., 2004), we include in the control sample all funds that do not experience a manager replacement, as defined in Section 3.4, during a four-year window between July of year $t-2$ to June of year $t+2$. The performance and other characteristics of the control funds are measured over the first half of the four-year window. This procedure enables us to construct a control sample of 3,398 observations for the 286 replacement events. Panel B of Table 4 displays the distribution of control observations across fund categories and time periods. Panel C of the table reports the ratio of the number of events to the number of controls in each period. One can see that this ratio is substantially lower for the 2000-2004 period. This is largely due to our assumption that no managers are replaced during the last two years of our sample period, for which we do not have the manager data. We then run pooled logit regressions with fund category and year dummies.[13]

We are mainly interested in how past performance, measured by peer-adjusted NAV-,

[13]Fund category and year dummies are included in all our logit regressions but are not reported in the tables. Due to the use of year dummies, all control observations for a year without a manager replacement are excluded from the regression.

discount- and stock-returns, is related to the probability of manager replacement. Here, we define a peer-adjusted measure as the difference between the measure for a specific fund and the contemporaneous average across all funds in the same category.[14] Since the cross-sectional variation of returns is different across fund categories, we would expect that the influence of a given magnitude of underperformance on the probability of manager replacement would also vary across fund categories. For example, an underperformance of one percent in the highly volatile international equity category would give much less information about managerial ability than a similar underperformance in the relatively stable municipal bond category. To address this problem, we standardize all category-adjusted returns by dividing them by the cross-sectional standard deviation within a given category.

Table 7 displays the results for several specifications of the logit regressions. Model I tests the predictive power of the lagged stock return, which is the sum of the NAV-return and discount return (minus the expense ratio). Models II and III test the predictive power of the two components of the stock return, i.e., the NAV-return and discount return, respectively. Model IV uses the NAV return and discount return jointly as explanatory variables. Model V extends model IV by including a list of control variables: the discount level, expense ratio, fund family size (log of the fund management company's total net assets within one fund category), portfolio turnover rate and NAV return volatility, all averaged over the two pre-replacement years; as well as the manager tenure, measured at the replacement time. All these variables are peer-adjusted and standardized in the same way as the return variables.[15]

[Table 7 about here.]

[14] In a previous version of this paper, we report similar results using measures adjusted by the average across all funds with the same investment objective. The disadvantage of this alternative measure is that the number of funds in each investment objective group is often rather small, which makes the estimation of the cross-sectional standard deviation within each group less accurate.

[15] Fund management companies may respond to poor performance by reducing management fees instead of firing the manager. This would potentially weaken the relation between past performance and manager replacement. However, we do not find any reliable relation between management fee changes and past or current fund performance.

The logit regressions confirm prior results reported in Table 5. Model I shows that the (standardized peer-adjusted) stock returns, during both year -2 and year -1, are negatively related to the probability of manager replacement. For example, an increase of one standard deviation in the stock return of a fund during year -1 results in a decrease of 30.5 percent in the log odds of replacement (versus non-replacement). Model II shows that lagged NAV-returns are negatively related to the probability of manager replacement. Model III shows that discount returns during both years -2 and -1 predict manager replacement. When past NAV-returns and discount returns are considered jointly (model IV), the coefficient of the NAV return in year -2 is no longer significant, while the significance of other return variables remains unchanged. This implies that the negative relation between the year -2 stock return and manager replacement is mainly driven by the discount return, while the negative effect of the year -1 stock return is driven by both the NAV-return and discount return. This result does not change when more control variables are included (model V). Overall, both the magnitude and the statistical significance of estimated coefficients are quite robust to changes in model specification.

Consistent with our prior results of Table 5, all models confirm a negative relation between past NAV-returns and manager replacement – which is consistent with the Effective Governance Hypothesis. The fact that discount returns during both year -2 and -1 are negatively related to manager replacement suggests that the ability learning effect dominates the replacement anticipation effect for the entire sample, perhaps because of a weak anticipation effect for bond funds (as shown in Figure 2). Also, the fact that discount returns predict manager replacement one year ahead of NAV returns (models IV and V) clearly indicates that investors are forward-looking. They do not form their beliefs about managerial ability only by looking at the fund's realized portfolio returns. Instead, they also observe other signals, perhaps including news reports about the fund manager, the concepts underlying the manager's portfolio strategies, or the performance of other funds managed by the same manager.

The relations between manager replacement and other fund characteristics shown in

model V are also interesting. The expense ratio is positively related to the probability of manager replacement. A higher management fee ratio implies that the management company will have stronger incentives to fire an underperforming manager to protect such fees from shareholder restructuring actions, such as open-ending the fund or changing the fund advisory company. The results also indicate that a large fund family is more likely to replace a manager, which is consistent with a disciplinary role of fund families as modeled by Gervais, Lynch, and Musto (2005). Furthermore, consistent with our previous result of decreasing NAV volatility prior to manager replacement, lower NAV return volatility is associated with a significantly higher probability of future manager replacement.

[Table 8 about here.]

[Table 9 about here.]

We further divide our sample into equity funds and bond funds, and rerun the logit regressions. Tables 8 and 9 present results for these two subsamples, respectively. Note that while the relations between manager replacement and the control variables vary somewhat across equity and bond funds, the influence of past performance variables (stock return, NAV return and discount return) are relatively stable, with one important difference. Specifically, for equity funds, manager replacement is significantly related to discount returns during year -2 but not during year -1; but for bond funds, replacement is significantly related to discount returns during both periods (see regression V in Table 9). The finding of an insignificant relation between manager replacement and the year -1 discount return among equity funds indicates that the replacement anticipation effect is strong enough to offset the ability learning effect during the period immediately before manager replacement. This supports our conjecture that the dynamics of the discount reflects not only investor beliefs about portfolio manager ability, but also the anticipation of manager turnover (Alternative Hypothesis IIa).

The finding of a significant relation between manager replacement and both lagged discount returns among bond funds indicates that the replacement anticipation effect is

relatively weak among these funds. This may be due to two reasons. First, investors may forecast manager replacement among bond funds with a lower precision. Note that the pseudo R^2s of the logit models for equity funds are about twice as high as for bond funds. Second, as we have shown previously, manager replacement has a weaker effect on fund performance among bond funds, which leads to a weak replacement anticipation effect.

6 Dynamic relation between NAV and discount returns

Our previous results suggest that discount dynamics reflect both investor learning about fund manager ability and anticipation of future manager replacement. We now examine more explicitly how discount returns are related to the fund's past and future NAV returns, and how these relations are affected by manager replacement.

In the absence of manager replacement, NAV returns may predict discount returns through a learning effect. For example, investors observing high NAV returns would infer that these returns are more likely to have been generated by a skilled manager – leading to a reduction in the discount. In addition, discount returns may predict NAV returns through a rational expectations effect. If investors receive information, from both the market and elsewhere, about manager skills, then a decrease in the discount should forecast good future NAV returns. However, we would expect both of these effects to be much weaker during the periods immediately surrounding a manager replacement event, as postulated by Alternative Hypothesis IIIa.

To test these conjectures, we run a Granger causality test using our panel data of discount returns and NAV returns. Consider the following regression equation:

$$y_{it} = \alpha_i + \sum_{l=1}^{p} \beta_l y_{i,t-l} + \sum_{l=1}^{p} \gamma_l x_{i,t-l} + u_{it}, \quad (i = 1,...,N; t = p+1,...,T_i), \tag{6}$$

where y_{it} is the observation for the dependent variable for fund i during year t, α_i is an unobservable individual effect, and p is the lag length sufficiently large to ensure that u_{it} is a white noise error term. If $\gamma_1 = \gamma_2 = ... = \gamma_p = 0$, then x does not Granger cause y.

Since we are interested in the dynamic relation between the discount return and the NAV return, these two variables are used in Equation (6) as the left-hand side variables. Both returns are measured on a calender year basis and as before, transformed into standardized deviations from contemporaneous category means.

It is well known that due to the presence of the individual effect, α_i, and the lagged dependent variables on the right-hand side, the standard pooled OLS or fixed effect estimator is inconsistent for panels with fixed time periods, i.e., its bias does not vanish even if the number of cross-sectional units goes to infinity (see Nickell (1981)).[16] A typical response to this is to first eliminate the individual effect α_i by first-differencing, then estimate the model using instrumental variables or Generalized Method of Moments (see Anderson and Hsiao (1981), Holtz-Eakin, Newey, and Rosen (1988) and Arellano and Bond (1991)).[17] The differenced model has the following form:

$$\Delta y_{it} = \sum_{l=1}^{p} \beta_l \Delta y_{i,t-l} + \sum_{l=1}^{p} \gamma_l \Delta x_{i,t-l} + \Delta u_{it}, \quad (i = 1,...,N; t = p+1,...,T_i), \tag{7}$$

where $\Delta y_{it} = y_{it} - y_{i,t-1}$, and the other terms are defined similarly.

We use the one-step GMM estimator developed by Arellano and Bond (1991) to estimate the parameters in Equation (7).[18] This estimator is constructed based on the following observation. Under the weak assumption that the error term, u_{it}, is uncorrelated with all past values of y and x, as well as with individual effects, the error term in Equation (7), Δu_{it}, is uncorrelated with $y_{i,t-j}$ and $x_{i,t-j}$ for $j \geq 2$. Namely,

$$E(y_{i,t-j}\Delta u_{it}) = E(x_{i,t-j}\Delta u_{it}) = 0, \quad (j = 2,...,t-1; t = p+1,...,T_i). \tag{8}$$

[16] Nevertheless, our main results remain qualitatively unchanged even when we estimate our model using OLS with clustering or fixed effects. The unreported OLS results are available upon request.

[17] This is necessary because the OLS estimator for this differenced equation is inconsistent, since the error term, $\Delta u_{it} = u_{it} - u_{i,t-1}$, is correlated with the regressor, $\Delta y_{it} = y_{i,t-1} - y_{i,t-2}$, due to the correlation between $y_{i,t-1}$ and $u_{i,t-1}$. Note also that Δu_{it} is a MA(1) process since it is the difference between two white noise terms.

[18] The two-step standard errors are found to be biased downward in small samples, therefore the one-step estimator is preferable for statistical inference.

Equation (8) represents a set of moment conditions that can be used to identify the parameters.[19] Since the consistency of this estimator relies crucially on the assumption of a white noise term in Equation (6), Arellano and Bond (1991) also derive a test for this assumption based on the fact that the lack of serial correlation in u_{it} implies that Δu_{it} should exhibit negative first-order autocorrelation, and no autocorrelation for orders 2 and beyond. We set $p = 2$ in Equation (7). The Arellano-Bond test suggests that this lag length leads to a white noise error term – thus ensuring the consistency of the Arellano-Bond estimator.

In order to examine whether manager turnover has an influence on the dynamic relation between discount returns and NAV returns, we run the regression separately for fund-years with and without a manager replacement event.[20] If there is a manager replacement (as defined in Section 3.4) in fund i during year t, then the observation with Δy_{it} as the dependent variable is included in the replacement sample. Otherwise it is included in the non-replacement sample. Since $p = 2$, four consecutive annual returns for a given fund must be available to form one observation. This leads to 217 observations in the replacement sample and 3,545 observations in the non-replacement sample.

Panel A of Table 10 reports results for the base-case model (7). The first two columns present results for the non-replacement sample, while the last two present results for the replacement sample. The Z-statistics (in parentheses) are based on asymptotic standard errors robust to general cross-sectional and time series heteroskedasticity. The χ^2 statistics for the Wald test of no Granger causality are reported in the last row of each panel.

In the non-replacement sample, there is two-way Granger causality between discount returns and NAV returns, and this causality is significant at 1% in both directions. If a fund outperforms its peer group during year $t-1$, its discount tends to narrow during year t, leading to a higher discount return (see the coefficient of 0.176 on R^N_{-1} in column two). At the same time, if a fund's discount narrows during year $t-1$ (relative to other funds in the same category), its underlying portfolio tends to outperform its peer group

[19] See Arellano and Bond (1991) for the explicit formulas.

[20] Since our manager data ends in June 2004, our regressions use annual data only up to 2003.

during year t (see the coefficients of 0.181 on R^D_{-1} in column one). These results indicate that investors not only update their assessment of the fund manager using the realized portfolio performance, but also correctly predict future portfolio performance. The results also show a negative autocorrelation in discount returns as well as NAV returns.

Interestingly, results are quite different for the replacement sample (columns three and four). As discussed previously, when there is a manager replacement during year t, investors will pay less attention to past NAV performance. Therefore, we should find a weaker relation between past NAV returns and current discount returns. This is exactly what our results indicate. NAV returns do not Granger cause discount returns in the replacement sample. In addition, the null hypothesis of no Granger causality from discount returns to NAV returns can be rejected only at the 10% level according to the Wald test. This indicates that the market may still be able to forecast fund performance when a manager is replaced, but to a lesser degree.

Pontiff (1995) finds that closed-end fund discounts exhibit a strong tendency to mean-revert. This is consistent with the negative autocorrelation of discount returns reported in Panel A of Table 10. As a robustness check, we add the discount level at the end of year $t-1$, peer-group adjusted and standardized, to our regressions as an additional explanatory variable. The results are reported in Panel B of Table 10. The previous results remain largely unchanged, but the negative autocorrelation in discount returns becomes weaker. This change is to be expected, since part of the mean reversion in discounts is now captured by the positive coefficient on the past discount level (see the highly significant coefficients on $Discount_{-1}$ shown in columns two and four of Panel B). Another difference in the results is that the null hypothesis of no Granger causality from discount returns to NAV returns now cannot be rejected for the replacement sample. This further indicates that investors may have difficulty in forecasting fund performance when there is a manager replacement.

[Table 10 about here.]

To summarize, our dynamic panel data analysis strongly rejects the null hypothesis

of no Granger causality between discount returns and NAV returns, and provides support for Alternative Hypothesis IIIa. The results are consistent with rationality in discount dynamics, and indicate that manager turnover may have an important effect on the dynamic relation between portfolio performance and discount changes.

7 Conclusion

Despite the large body of research on closed-end fund discounts, previous studies have found only a weak relation between discounts and the fund's portfolio performance. One reason for this failure is that prior studies have ignored the impact of events that might change this relation. An example is the replacement of a closed-end fund manager.

In this paper, we find evidence of effective internal governance in closed-end funds, in that underperforming managers are replaced. Furthermore, the discount change reflects both investor learning about managerial ability and the anticipation of manager replacement. For equity funds, the peer-adjusted discount first increases, and then decreases prior to manager replacement, reflecting the presence of both a learning and an anticipation effect. For bond funds, the peer-adjusted discount continues to increase until the manager replacement date, indicating that the anticipation effect is always dominated by the learning effect.

We also find a stronger discount-performance relation after controlling for manager replacement events. Specifically, discount dynamics reveal that, in the absence of manager replacement, investors not only update their assessment of managerial ability based on past fund performance, but also exhibit an ability to forecast the future fund performance. This two-way Granger causality weakens when a fund undergoes a manager replacement event. These results suggest that there is a close relation between fund discounts and fund performance, however, this relation can be broken by actions or events that are endogenously induced by fund performance.

Although manager replacement, which is examined in this paper, is a prominent ex-

ample of such an event, many other actions taken by the fund management company, the fund's board of directors, or outside investors, such as a liquidation, open-ending, seasoned share issuance, merger and acquisition or share repurchase, may have similar effects.[21] Future research that endogenizes such actions will undoubtedly bring new insights to the closed-end fund discount puzzle.

[21] For instance, Bradley, Brav, Goldstein, and Jiang (2006) document that higher discounts increase the probability of open-ending attempts by activist shareholders, while the expectation of open-ending reduces discounts.

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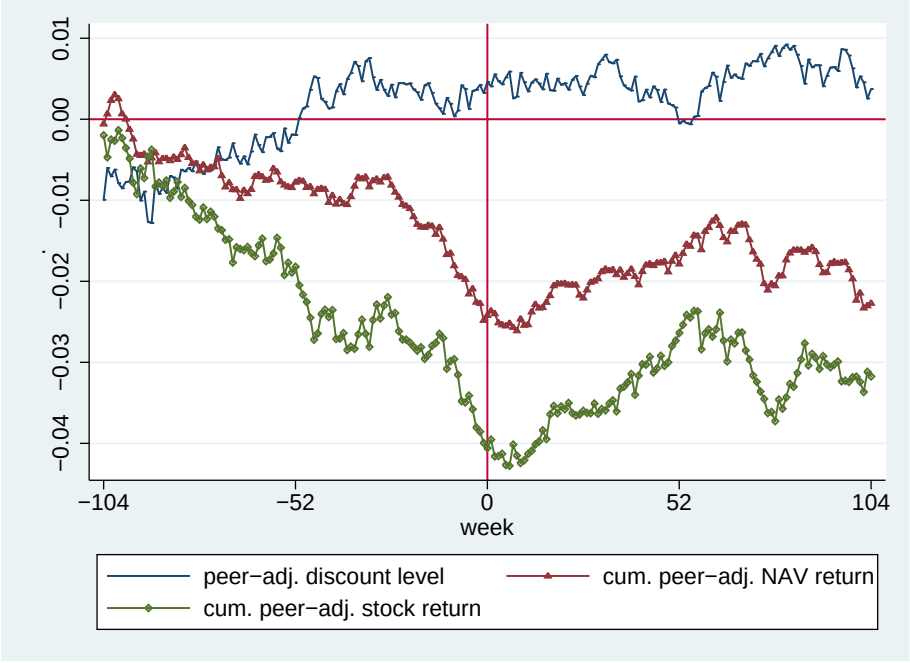
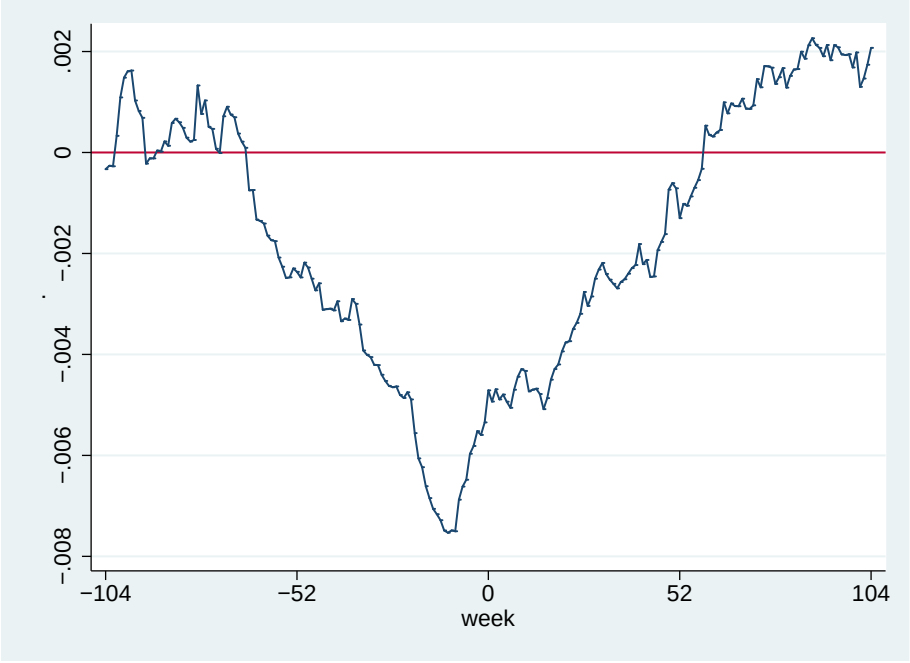


(A)



(B)

Figure 1: **Fund performance and volatility surrounding manager replacement**

Panel A plots the average peer-adjusted discount level, cumulative NAV return and stock return over the four-year event window for 286 replacement events. Panel B plots the peer-adjusted NAV return volatility over the same period. For each event fund, a peer group is defined as all funds within the same investment objective group but not experiencing a manager replacement during the four-year event window.

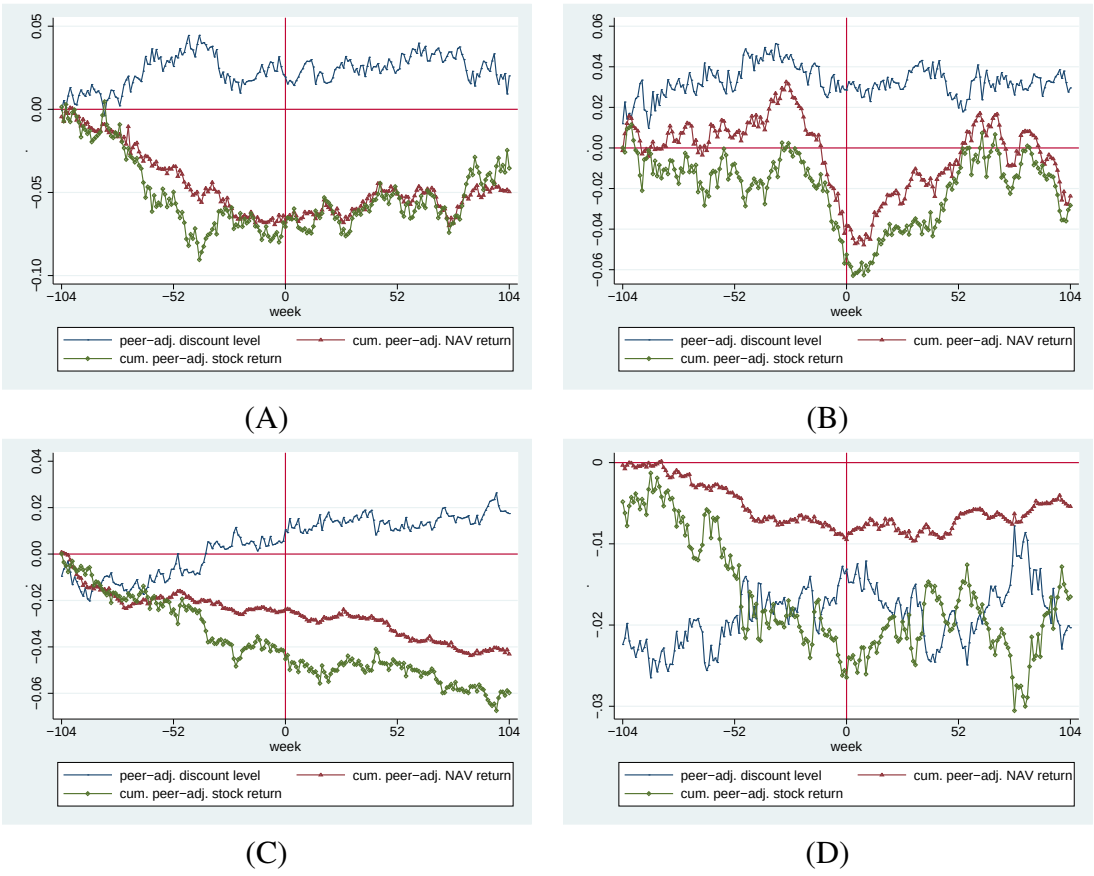


Figure 2: **Fund performance and discounts surrounding manager replacement**

This figure shows the average peer-adjusted discount level, cumulative NAV return and stock return for manager replacement events in each closed-end fund category over the four-year event window. For each event fund, a peer-group is defined as all funds within the same investment objective but not experiencing a manager replacement during the four-year event window. Panel A, B, C, D correspond to domestic equity, international equity, taxable bond , and municipal bond funds, respectively.

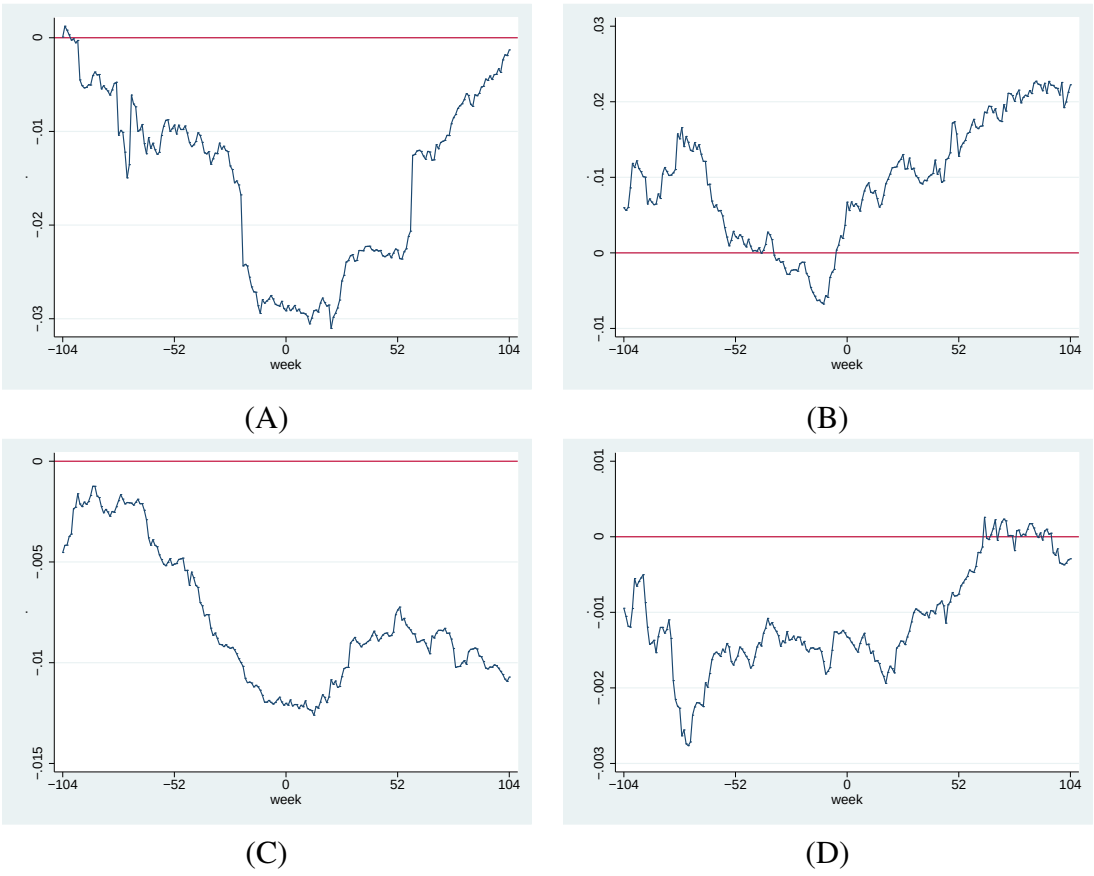


Figure 3: **Volatility surrounding manager replacement**

This figure shows the average peer-adjusted NAV return volatility (annualized) for manager replacement events in each closed-end fund category. The volatility for week t is measured using the weekly NAV returns from week $t-51$ to week t. For each event fund, a peer-group is defined as all funds within the same investment objective but not experiencing a manager replacement during the four-year event window. Panel A, B, C, D correspond to domestic equity, international equity, taxable bond, and municipal bond funds, respectively.

Table 1: **Closed-end fund sample**

This table summarizes the closed-end fund sample, which was created by matching the Lipper closed-end fund database with the Morningstar fund manager database. Funds are classified into four broad categories. Each category is further divided into several sub-groups according to the investment objectives of the funds. Our matched sample consists of 579 funds, each with, on average, 594 weekly return observations.

Fund Category	Investment Objective	Number
Domestic Equity	Core Funds	17
(60 Funds)	Growth Funds	8
	Sector Equity Funds	22
	Value Funds	13
International Equity	Eastern European Funds	4
(70 Funds)	Emerging Markets Funds	4
	Global Funds	6
	Latin American Funds	11
	Misc Country/Region Funds	6
	Pacific Ex Japan Funds	22
	Pacific Region Funds	6
	Western European Funds	11
Taxable Bond	Adjustable Rate Mortgage Funds	5
(137 Funds)	Corporate Debt Funds BBB-Rated Funds	19
	Flexible Income Funds	13
	General Bond Funds	14
	General U.S. Government Funds	7
	General U.S. Government Funds (Leveraged)	4
	High Current Yield Funds	9
	High Current Yield Funds (Leveraged)	28
	Loan Participation Funds	5
	U.S. Mortgage Funds	16
	U.S. Mortgage Term Trust Funds	17
Municipal Bond	California Insured Municipal Debt Funds	13
(312 Funds)	California Municipal Debt Funds	30
	Florida Municipal Debt Funds	18
	General and Insured Muni Funds (Unleveraged)	26
	General Muni Debt Funds (Leveraged)	59
	High Yield Municipal Debt Funds	15
	Insured Muni Debt Funds (Leveraged)	28
	Michigan Municipal Debt Funds	7
	Minnesota Municipal Debt Funds	3
	New Jersey Municipal Debt Funds	15
	New York Insured Municipal Debt Funds	16
	New York Municipal Debt Funds	23
	Other States Municipal Debt Funds	45
	Pennsylvania Municipal Debt Funds	14

Table 2: **Summary statistics**

This table summarizes various fund characteristics for 5 sample years, 1985, 1990, 1995, 2000, 2005, as well as for the entire sample period. For each sample year, we report the total number of funds, as well as the average: end-of-year total net assets and discount level; annual expense ratio, NAV return, discount return, and stock return. Annual returns are calculated as 52 times average weekly returns. Only funds with at least 40 weekly return observations in a particular year are included. Statistics for the entire sample period are averages over all fund-years.

		1985	1990	1995	2000	2005	All Years
N of funds	All Funds	25	168	414	398	444	579
	Domestic Equity	5	31	40	42	44	60
	Inter. Equity	0	28	63	58	47	70
	Taxable Bond	20	69	111	101	82	137
	Municipal Bond	0	40	200	197	271	312
TNA	All Funds	145	227	240	252	297	250
($ million)	Domestic Equity	328	238	319	428	606	380
	Inter. Equity		119	194	164	305	180
	Taxable Bond	99	238	278	270	336	274
	Municipal Bond		276	217	230	232	226
Discount	All Funds	1.37	5.56	8.40	9.08	4.38	5.04
(%)	Domestic Equity	4.27	10.09	9.33	10.61	5.24	8.02
	Inter. Equity		7.38	5.88	19.15	3.29	7.32
	Taxable Bond	0.65	6.07	7.68	3.43	7.63	3.42
	Municipal Bond		-0.12	9.42	8.71	3.44	4.58
Expense	All Funds		1.25	1.20	1.24	1.11	1.19
(%/year)	Domestic Equity		1.32	1.36	1.42	1.55	1.41
	Inter. Equity		1.85	1.78	1.96	1.69	1.89
	Taxable Bond		1.15	1.01	1.04	1.15	1.05
	Municipal Bond		0.93	1.08	1.08	0.92	1.01
NAV return	All Funds	23.71	-2.38	17.61	3.51	7.63	8.10
(%/year)	Domestic Equity	23.77	-8.58	23.49	3.01	8.01	9.89
	Inter. Equity		-12.75	-2.92	-29.12	21.97	7.85
	Taxable Bond	23.69	-0.74	20.21	1.60	4.34	8.29
	Municipal Bond		6.86	21.46	14.21	6.08	7.64
Discount return	All Funds	1.00	-7.64	0.09	4.15	-0.22	-0.25
(%/year)	Domestic Equity	-1.13	-1.84	1.17	2.66	-2.64	0.34
	Inter. Equity		-28.12	0.91	-1.28	1.40	0.10
	Taxable Bond	1.53	-4.98	-1.32	11.35	-4.89	-0.56
	Municipal Bond		-2.41	0.40	2.38	1.31	-0.31
Stock return	All Funds	23.81	-11.27	16.50	6.45	6.29	6.67
(%/year)	Domestic Equity	21.58	-11.74	23.31	4.24	3.84	8.84
	Inter. Equity		-42.73	-3.80	-32.22	21.66	6.07
	Taxable Bond	24.37	-6.87	17.88	11.92	-1.69	6.69
	Municipal Bond		3.53	20.78	15.50	6.44	6.32

Table 3: **Manager characteristics during five sample years**

This table summarizes the manager characteristics measured at the end of 1985, 1990, 1995, 2000, as well as at the end of June 2004. The last column reports the average manager characteristics measured across all fund-years from 1985 to 2004. Panel A reports the average manager tenure (in years) across funds. For a team-managed fund, manager tenure is measured as the longest tenure of all managers active at the measurement time. Panel B reports the average number of managers who were involved in the management of a specific fund. Panel C reports the average number of funds, including open-end funds, that an active closed-end fund manager simultaneously manages, either independently or jointly with others.

	1985	1990	1995	2000	2004.6	All years
Panel A: Average manager tenure (years)						
All Funds	7.54	3.32	4.28	7.25	7.34	5.48
Domestic Equity	10.24	6.18	7.39	9.58	9.94	8.36
Inter. Equity	1.98	2.25	4.01	6.29	7.70	4.89
Taxable Bond	6.78	3.59	5.15	8.72	9.60	6.29
Municipal Bond	NA	1.77	3.18	6.33	6.11	4.52
Panel B: Average management team size (# persons)						
All Funds	1.32	1.37	1.49	1.51	1.73	1.51
Domestic Equity	1.08	1.45	1.67	1.74	1.86	1.62
Inter. Equity	1.00	1.19	1.46	1.41	1.46	1.39
Taxable Bond	1.59	1.54	1.92	2.06	2.16	1.88
Municipal Bond	NA	1.21	1.22	1.22	1.61	1.32
Panel C: Average number of funds managed by a manager						
All Funds	1.37	2.50	4.32	4.11	4.47	3.84
Domestic Equity	1.17	1.68	2.75	2.90	3.13	2.49
Inter. Equity	1.25	1.41	2.15	2.52	2.13	2.02
Taxable Bond	1.48	2.51	4.20	3.59	3.02	3.30
Municipal Bond	NA	4.94	8.44	7.38	8.73	7.78

Table 4: **The distribution of manager replacement and control observations**

Panel A presents the distribution of manager replacement events across time and fund categories. A manager replacement occurs when at least one of the managers with the longest tenure (not less than two years) is replaced by a new manager(s). Panel B reports the distribution of the control sample, which is constructed as follows: for any given year t, we include in the control sample all funds that do not experience any manager replacement as defined above over the period from July of year $t-2$ to June of year $t+2$. Panel C reports the ratio of the number of events to the number of controls in each period.

	1985-1989	1990-1994	1995-1999	2000-2004	All years
Panel A: Distribution of manager replacement events					
All Funds	7	64	154	61	286
Domestic Equity	2	7	10	5	24
Inter. Equity	1	10	35	15	61
Taxable Bond	4	24	38	8	74
Municipal Bond	0	23	71	33	127
Panel B: Distribution of control funds					
All Funds	65	562	1311	1460	3398
Domestic Equity	18	106	141	160	425
Inter.Equity	7	90	148	175	420
Taxable Bond	37	204	371	325	937
Municipal Bond	3	162	651	800	1616
Panel C: ratio of event funds to control funds					
All Funds	0.11	0.11	0.12	0.04	0.08
Domestic Equity	0.11	0.07	0.07	0.03	0.06
Inter.Equity	0.14	0.11	0.24	0.09	0.15
Taxable Bond	0.11	0.12	0.10	0.02	0.08
Municipal Bond	0.00	0.14	0.11	0.04	0.08

Table 5: **Peer-adjusted performance surrounding manager replacement**

This table reports the average peer-adjusted NAV-return (R^N), discount return (R^D) and stock return (R^S) during each of the four years surrounding manager replacement, as well as the average differences in these measures between year +1 and year -1 and between year +2 and year -1. The peer-group consists of funds with the same investment objective but without manager replacement in the four-year event window. All returns are in percent. T-statistics based on robust standard errors allowing for clustering of error terms at the manager level are in parentheses. *, **, *** denote statistical significance at the 10%, 5% and 1% levels respectively.

Year	-2	-1	1	2	+1 vs -1	+2 vs -1
Panel A. full sample						
N	286	286	280	274	280	274
R^N	-0.84	-1.64**	0.76	-0.41	2.45**	1.24
	(-1.11)	(-2.58)	(1.04)	(-0.73)	(2.38)	(1.29)
R^D	-1.07**	-0.48	0.61	-0.11	1.03	0.42
	(-2.14)	(-1.02)	(1.64)	(-0.26)	(1.63)	(0.63)
R^S	-1.89**	-2.10***	1.38*	-0.51	3.48***	1.66*
	(-2.36)	(2.92)	(1.91)	(-0.88)	(3.32)	(1.66)
Panel B. Domestic equity						
N	24	24	24	23	24	23
R^N	-3.60	-2.79	1.66	0.34	4.45*	2.82
	(-1.64)	(-1.60)	(0.90)	(0.17)	(1.92)	(1.39)
R^D	-2.17	1.52	0.22	1.33	-1.30	0.03
	(-1.35)	(0.98)	(0.15)	(0.98)	(-0.85)	(0.01)
R^S	-5.72	-1.10	2.05	1.77	3.15	2.72
	(-1.69)	(-0.47)	(0.86)	(0.86)	(0.97)	(0.87)
Panel C. International Equity						
N	61	61	61	61	61	61
R^N	0.49	-4.70*	3.00	-1.55	7.70*	3.15
	(0.15)	(-1.73)	(0.93)	(-0.65)	(1.77)	(0.77)
R^D	-1.36	-0.18	1.03	-0.11	1.20	0.07
	(-0.93)	(-0.13)	(0.85)	(-0.09)	(0.65)	(0.03)
R^S	-0.84	-4.84*	4.05	-1.62	8.90**	3.22
	(-0.29)	(-1.73)	(1.39)	(-0.79)	(2.19)	(0.85)
Panel D. Taxable bond						
N	74	74	69	68	69	68
R^N	-1.86**	-0.60	-0.65	-0.81*	0.05	-0.18
	(-2.39)	(-1.11)	(-1.19)	(-1.78)	(0.07)	(-0.25)
R^D	-0.68	-1.01	0.24	-0.43	0.98	0.52
	(-0.91)	(-0.92)	(0.34)	(-0.56)	(0.62)	(0.32)
R^S	-2.54**	-1.62	-0.46	-1.24	1.03	0.39
	(-2.37)	(-1.60)	(-0.55)	(-1.66)	(0.77)	(0.27)
Panel E. Municipal bond						
N	127	127	126	122	126	122
R^N	-0.37	-0.56**	0.27*	0.24	0.84**	0.78**
	(-1.25)	(-2.02)	(1.74)	(1.54)	(2.57)	(2.65)
R^D	-0.94	-0.70*	0.69*	-0.20	1.41**	0.61
	(-1.28)	(-1.70)	(1.92)	(-0.37)	(2.41)	(1.09)
R^S	-1.29	-1.26***	0.95**	0.03	2.26***	1.39**
	(-1.44)	(-2.74)	(2.21)	(0.05)	(3.46)	(2.15)

Table 6: **Peer-adjusted discount and volatility**

This table reports the average peer-adjusted discount level and NAV return volatility (annualized) surrounding manager replacement events, as well as the average differences in these measures between week +52 and week -1 and between week +104 and week -1. The volatility for week t is measured using the weekly returns from week $t-51$ to week t. The peer-group consists of funds with the same investment objective but without manager replacement in the four-year event window. The discount and volatility are in percent. T-statistics based on robust standard errors allowing for clustering of error terms at the manager level are in parentheses. *, **, *** denote statistical significance at the 10%, 5% and 1% levels respectively.

week	-104	-53	-1	52	104	52 vs -1	104 vs -1
Panel A. full sample							
Disc.	-0.99*	-0.19	0.32	-0.05	0.37	-0.40	-0.00
	(1.81)	(-0.30)	(0.54)	(-0.07)	(0.61)	(-0.92)	(-0.01)
Vola.	-0.03	-0.23	-0.53*	-0.13	0.21	0.37	0.65***
	(-0.09)	(-0.75)	(-1.71)	(-0.43)	(0.68)	(1.59)	(2.73)
Panel B. Domestic equity							
Disc.	-0.08	3.13*	2.10	2.35	2.01	0.25	0.02
	(-0.04)	(1.76)	(1.26)	(1.08)	(1.27)	(0.19)	(0.02)
Vola.	0.01	-0.97	-2.89*	-2.27	-0.13	0.62*	2.04**
	(0.00)	(-0.59)	(1.89)	(-1.49)	(-0.12)	(0.95)	(2.12)
Panel C. International equity							
Disc.	1.19	2.77*	2.87*	1.97	2.96*	-0.90	0.09
	(0.73)	(1.96)	(1.73)	(1.01)	(1.98)	(-0.60)	(0.06)
Vola.	0.60	0.28	0.36	1.28	2.22*	0.91	1.86*
	(0.42)	(0.25)	(0.30)	(1.17)	(1.80)	(0.93)	(1.97)
Panel D. Taxable bond							
Disc.	-0.96	-0.66	0.55	1.04	1.74*	0.45	1.16
	(-1.09)	(-0.61)	(0.59)	(1.17)	(1.68)	(0.56)	(1.11)
Vola.	-0.45	-0.52	-1.21***	-0.74**	-1.07***	0.38	0.05
	(-1.65)	(-1.32)	(-4.83)	(-2.11)	(-3.88)	(1.31)	(0.19)
Panel E. Municipal bond							
Disc.	-2.24***	-1.97**	-1.37*	-2.07**	-2.03**	-0.73*	-0.71
	(-3.86)	(2.15)	(-1.66)	(-2.19)	(-2.51)	(-1.98)	(-1.31)
Vola.	-0.09	-0.17	-0.13	-0.08	-0.03	0.05	0.10
	(-0.42)	(-0.99)	(-0.94)	(-0.43)	(-0.19)	(0.55)	(0.72)

Table 7: **Determinants of manager replacement: full sample**

This table presents logit regression results for the full sample. The dependent variable is 1 for replacement, and 0 for non-replacement. The main explanatory variables are lagged stock returns R^S_{-1}, R^S_{-2}; lagged NAV returns R^N_{-1}, SAR^N_{-2}; and lagged discount returns R^D_{-1}, R^D_{-2}. The last model also includes a list of control variables: the discount level, expense ratio, fund family size (log of the fund management company's total net assets within one fund category), portfolio turnover rate and NAV return volatility, all averaged over the two pre-replacement years; as well as the manager tenure, measured at the replacement time. These variables are all standardized by subtracting the category average and then dividing by the cross-sectional standard deviation within each fund category. Year dummies and fund category dummies are included in all regressions but not reported. Z-statistics based on robust standard errors allowing for clustering of error terms at the manager level are in parentheses. *,**, *** denote statistical significance at the 10%, 5% and 1% levels respectively.

	I	II	III	IV	V
R^S_{-1}	-0.305***				
	(-4.46)				
R^S_{-2}	-0.168**				
	(-2.12)				
R^N_{-1}		-0.242***		-0.263***	-0.285***
		(-3.88)		(-4.08)	(-4.22)
R^N_{-2}		-0.139*		-0.118	-0.114
		(-1.69)		(-1.41)	(-1.30)
R^D_{-1}			-0.164**	-0.176**	-0.169**
			(-2.27)	(-2.48)	(-2.24)
R^D_{-2}			-0.155**	-0.157**	-0.175**
			(-2.21)	(-2.20)	(-2.34)
Discount					-0.079
					(-0.80)
Expense					0.204**
					(2.15)
Size					0.278**
					(2.39)
Tenure					-0.129
					(-1.28)
Turnover					0.134
					(1.61)
Volatility					-0.253***
					(-2.72)
Constant	-2.245***	-2.200***	-2.213***	-2.212***	-2.777**
	(-2.69)	(-2.60)	(-2.73)	(-2.61)	(-2.51)
N	3684	3684	3684	3684	3630
PseudoR^2	0.090	0.085	0.080	0.090	0.111

Table 8: **Determinants of manager replacement: equity funds**

This table presents logit regression results for domestic and international equity samples. The dependent variable is 1 for replacement, and 0 for non-replacement. The main explanatory variables are lagged stock returns R^S_{-1}, R^S_{-2}; lagged NAV returns R^N_{-1}, SAR^N_{-2}; and lagged discount returns R^D_{-1}, R^D_{-2}. The last model also includes a list of control variables: the discount level, expense ratio, fund family size (log of the fund management company's total net assets within one fund category), portfolio turnover rate and NAV return volatility, all averaged over the two pre-replacement years; as well as the manager tenure, measured at the replacement time. These variables are all standardized by subtracting the category average and then dividing by the cross-sectional standard deviation within each fund category. Year dummies and fund category dummies are included in all regressions but not reported. Z-statistics based on robust standard errors allowing for clustering of error terms at the manager level are in parentheses. *,**, *** denote statistical significance at the 10%, 5% and 1% levels respectively.

	I	II	III	IV	V
R^S_{-1}	-0.216**				
	(-2.05)				
R^S_{-2}	-0.146				
	(-1.26)				
R^N_{-1}		-0.220**		-0.228**	-0.375***
		(-2.28)		(-2.21)	(-2.88)
R^N_{-2}		-0.098		-0.143	-0.180
		(-0.87)		(-1.19)	(-1.29)
R^D_{-1}			-0.029	-0.072	-0.186
			(-0.28)	(-0.62)	(-1.23)
R^D_{-2}			-0.204*	-0.235**	-0.292**
			(-1.94)	(-2.16)	(-2.20)
Discount					0.363**
					(2.16)
Expense					-0.024
					(-0.12)
Size					0.387*
					(1.90)
Tenure					-0.371*
					(-1.87)
Turnover					0.293**
					(2.33)
Volatility					-0.131
					(-0.76)
Constant	-18.426***	-18.520***	-18.314***	-18.382***	-2.313***
	(-18.34)	(-18.47)	(-17.79)	(-16.60)	(-3.44)
N	928	928	928	928	901
PseudoR^2	0.139	0.137	0.135	0.144	0.203

Table 9: **Determinants of manager replacement: bond funds**

This table presents logit regression results for taxable bond and municipal bond samples. The dependent variable is 1 for replacement, and 0 for non-replacement. The main explanatory variables are lagged stock returns R^S_{-1}, R^S_{-2}; lagged NAV returns R^N_{-1}, R^N_{-2}; and lagged discount returns R^D_{-1}, R^D_{-2}. The last model also includes a list of control variables: the discount level, expense ratio, fund family size (log of the fund management company's total net assets within one fund category), portfolio turnover rate and NAV return volatility, all averaged over the two pre-replacement years; as well as the manager tenure, measured at the replacement time. These variables are all standardized by subtracting the category average and then dividing by the cross-sectional standard deviation within each fund category. Year dummies and fund category dummies are included in all regressions but not reported. Z-statistics based on robust standard errors allowing for clustering of error terms at the manager level are in parentheses. *,**, *** denote statistical significance at the 10%, 5% and 1% levels respectively.

	I	II	III	IV	V
R^S_{-1}	-0.359***				
	(-4.13)				
R^S_{-2}	-0.176*				
	(-1.71)				
R^N_{-1}		-0.241***		-0.261***	-0.274***
		(-2.97)		(-3.19)	(-3.15)
R^N_{-2}		-0.148		-0.096	-0.088
		(-1.36)		(-0.89)	(-0.78)
R^D_{-1}			-0.251***	-0.248***	-0.218**
			(-2.76)	(-2.80)	(-2.42)
R^D_{-2}			-0.144	-0.139	-0.188**
			(-1.61)	(-1.56)	(-1.97)
Discount					-0.225**
					(-2.00)
Expense					0.272**
					(2.39)
Size					0.191
					(1.39)
Tenure					-0.085
					(-0.76)
Turnover					0.102
					(0.86)
Volatility					-0.259**
					(-2.14)
Constant	-1.820**	-1.753**	-1.846**	-1.762**	-2.522**
	(-2.26)	(-2.15)	(-2.37)	(-2.16)	(-2.28)
N	2528	2528	2528	2528	2486
PseudoR^2	0.085	0.076	0.074	0.083	0.108

Table 10: **Dynamic relation between NAV and discount returns**

We run a Granger causality test using a panel of annual discount returns and NAV returns. Panel A reports results for the base-case model. Panel B reports results for an extended model, controlling for the discount level at the end of year $t-1$. Parameters are estimated using a one-step GMM procedure developed by Arellano-Bond (1991) for dynamic panel data models. R^N, R^D, and *Discount* denote the standardized category-adjusted NAV return, discount return, and discount level, respectively. Z-statistics based-on asymptotic standard errors robust to general cross-sectional and time-series heteroskedasticity are in parentheses. χ^2 statistics for the Wald test of no Granger causality are reported in the last row of each panel. *, **, *** denote statistical significance at the 10%, 5% and 1% levels respectively.

Panel A: Base-case model				
	Non-replacement sample		Replacement sample	
	R^N	R^D	R^N	R^D
R^N_{-1}	-0.162***	0.176***	-0.686***	-0.014
	(-5.61)	(4.92)	(-8.40)	(-0.16)
R^N_{-2}	-0.083***	0.012	-0.341***	0.043
	(-3.79)	(0.52)	(-5.38)	(0.51)
R^D_{-1}	0.181***	-0.174***	0.118**	-0.727***
	(3.89)	(-7.13)	(2.24)	(-10.83)
R^D_{-2}	-0.002	-0.071***	0.027	-0.290***
	(-0.09)	(-3.61)	(0.49)	(-3.84)
N	3545	3545	217	217
$H0$	$R^D \not\Rightarrow R^N$	$R^N \not\Rightarrow R^D$	$R^D \not\Rightarrow R^N$	$R^N \not\Rightarrow R^D$
χ^2_2	17.10***	24.22***	5.92*	0.63
Panel B: Extended model				
	Non-replacement sample		Replacement sample	
	R^N	R^D	R^N	R^D
R^N_{-1}	-0.180***	0.095***	-0.711***	-0.013
	(-6.93)	(3.20)	(-8.03)	(-0.18)
R^N_{-2}	-0.060***	0.020	-0.344***	0.062
	(-2.76)	(1.12)	(-5.39)	(0.90)
R^D_{-1}	0.068**	0.031	0.176*	-0.152*
	(2.46)	(1.22)	(1.88)	(-1.67)
R^D_{-2}	-0.000	0.053***	0.062	-0.035
	(-0.02)	(2.72)	(1.10)	(-0.55)
$Discount_{-1}$	0.095	0.674***	0.157	1.055***
	(1.65)*	(14.66)	(1.03)	(6.62)
N	3545	3545	217	217
$H0$	$R^D \not\Rightarrow R^N$	$R^N \not\Rightarrow R^D$	$R^D \not\Rightarrow R^N$	$R^N \not\Rightarrow R^D$
χ^2_2	10.01***	10.48***	3.56	1.74