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Abstract

This paper provides new evidence supporting the rationality of closed-end fund discounts by analyzing the time-series dynamics of individual fund discounts and their relation to portfolio performance and manager turnover. We show that discount changes reflect rational investor learning about fund manager skills, as well as investor anticipation of manager replacement events. Specifically, prior to the replacement of a manager, the fund's discount initially increases as fund performance worsens – for domestic equity funds, the peer-adjusted discount increases by about 3 percent during year -2 (relative to the manager replacement event), which is sizable, compared to the average closed-end fund discount of 5.6 percent at the end of 2002. However, after this initial increase, the discount does not respond to continuing underperformance by the manager, indicating that investors rationally anticipate that the manager will be replaced. Overall, our study demonstrates that a significant rational component exists in closed-end fund discounts.

1 Introduction

Closed-end fund discounts have been the focus of a large literature over the past few decades, and represent a major paradox in financial economics.[1] Specifically, the significant wedge between the price of fund-level shares and the corresponding value of the underlying securities has been a persistent source of controversy since these securities are, in many cases, priced transparently by the market almost continuously throughout each business day. For example, stocks held by U.S. closed-end equity funds (with the exception of very small issues) are traded frequently during the open hours of the New York Stock Exchange or Nasdaq. Further, each business day at the market close (4:00 p.m., New York time), securities held by such a closed-end fund are, for the most part, accurately priced and reflected in the closing net asset value for that day. This value is widely disseminated in the financial press at least once per week. However, this transparency of the value of underlying portfolio holdings does not usually lead to a corresponding clarity in the market's valuation of the closed-end fund shares.

The aggregate economic value of the discount is relatively large, especially in relation to the value of underlying fund assets. For example, the average U.S. closed-end fund traded at a discount of 5.6 percent at the end of 2002 – amounting to an aggregate discount of almost $9 billion out of total closed-end fund assets of $156 billion.[2] In addition, the presence of such a significant discount seemingly violates the law of one price, where a simple repackaging of securities should not create or destroy value. Correspondingly, these observations have attracted the attention of a large number of financial economists and investment practitioners.

Various rational theories and empirical tests have attempted to explain the presence of this wedge in pricing, based on such approaches as the potential illiquidity of fund holdings (Seltzer (1989)); the tax overhang of capital gains (Fredman and Scott (1991)); agency problems (Barclay, Holderness, and Pontiff (1993)); and the present value of fees

[1] Dimson and Minio-Kozerski (1999) give an excellent survey of this literature.

[2] See Investment Company Institute (2003).

in excess of manager talents (Ross (2002)), or in excess of liquidity benefits provided by closed-end funds (Cherkes, Sagi, and Stanton (2005)). While these papers provide valuable insights, they cannot fully rationalize the observed patterns in closed-end fund discounts. Given the lack of theoretical explanations within the standard finance paradigm, the behavioral finance literature (see, for example, Lee, Shleifer, and Thaler (1991)) has attempted to address fund discounts through the existence of irrational traders, namely, individual investors.[3]

Recently, Berk and Stanton (2005) develop a rational model that is consistent with the stylized facts about closed-end fund discounts, as identified by Lee, Shleifer, and Thaler (1990). In particular, the Berk-Stanton model offers an explanation for the phenomenon that closed-end fund shares are issued at, or above, their NAV, then generally move to a discount. The key to their model is that a closed-end fund manager, whose ability to generate excess returns is imperfectly observable, is insured by a labor contract. When a manager is revealed to be talented, he renegotiates or leaves for better terms elsewhere – capturing all of the surplus he generates. However, when a manager is revealed to lack talent, he cannot be fired due to the insurance provided by his contract – thus, generating a persistent discount.

In this paper, we conduct the first comprehensive empirical investigation of the dynamics of individual fund discounts. Specifically, we wish to determine whether discounts contain a significant component that is related to investor perceptions of fund manager talents. If discounts rationally reflect information about the talents of a manager, as implied by Berk and Stanton (2005), then discounts should have time-series properties that reflect investor learning about these talents – the discount should widen with the poor performance of the manager, and narrow with good performance.

However, this relation will depend crucially on the fund's internal governance actions. For example, we would expect that a fund having an effective governance system would

[3]Recent literature has seen a synthesis of the rational and behavioral approaches. For example, Gemmill and Thomas (2002) present evidence that short-term discount movements depend on investor sentiment, as measured by mutual fund flows, while long-term discount levels depend on limited arbitrage and levels of management fees.

respond to poor manager performance by terminating the investment contract of the management company. Although Berk and Stanton (2005) point out that this action is almost never taken in actuality, management companies often terminate the person who manages the fund in an attempt to rectify poor performance. In fact, even under a stringent definition of manager replacement, we find that 44 percent of U.S. closed-end funds replaced their fund managers at least once during the 1985 to 2002 period. If the fund manager has a significant impact on performance, then we would expect that the dynamics of the discount (if rationally set by investors) would vary when such a replacement event occurs, or is anticipated to occur.[4]

For instance, while discount dynamics may reflect the learning of investors about fund manager talents, they may also reflect the rational beliefs of investors about the likelihood of an impending manager replacement event. If so, then discount dynamics, and their relation to the performance of a fund, may be more complex. Thus, manager replacement events provide further opportunities to study whether discounts are rationally set.

To conduct our study, we assemble a database of share prices and NAV prices, along with the date of manager replacement events, for all U.S. closed-end funds in existence from 1985 to 2002. Next, we use this dataset to study the dynamics of the portfolio performance (NAV return) of funds. We confirm that, similar to previous results from the open-end fund industry, past peer-group adjusted NAV returns help to predict manager replacement in closed-end funds.[5] Specifically, replaced managers underperform their peer groups in the two-year event window prior to replacement, followed by improved performance (by the new manager) during the following two years. This result confirms that at least some of the funds in our sample exhibit effective governance in that they discipline underperforming fund managers – which sets up our analysis of whether investors rationally respond to (and anticipate) this event when setting fund share prices (and, thus, the discount).

[4]With the notable exception of Chay and Trzcinka (1999), who document that the level of the discount predicts future NAV performance, past studies have generally found an insignificant correlation between fund performance and discounts – however, these studies do not endogenize manager replacement events.

[5]See, for example, Khorana (1996) and Ding and Wermers (2005).

We next examine the dynamics of the discount surrounding manager replacement events. We find an intriguing result in the domestic fund sample: the peer-adjusted discount widens during year -2, relative to the replacement event, but does not change significantly during year -1. This finding suggests that investors, as they observe poor performance, initially capitalize their beliefs about the (poor) ability of a fund manager into the stock price. However, they eventually recognize that this manager is very likely to be replaced – thus, the discount return stops responding to poor NAV returns.

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), discount levels, expense ratios, and fund size. 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 patterns of discount changes preceding the replacement event, this finding indicates 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 rationally responds to information about manager ability reflected in prior portfolio performance, consistent with the predictions of Berk and Stanton (2005). In addition, we find that lagged peer-adjusted discount returns predict peer-adjusted NAV returns (controlling for lagged peer-adjusted NAV returns), indicating that discounts reflect information about manager ability that is not reflected in prior manager performance.

More importantly, we find that these relations disappear when a fund experiences a manager replacement event – that is, neither lagged NAV returns nor lagged discount changes predict the other variable. This result again suggests that fund investors rationally anticipate that a manager replacement is imminent, therefore, they disregard the past NAV performance (of the replaced manager) when setting the discount. In addition, the discount does not predict future NAV returns, as investors may be uninformed about the quality of the new manager.

Overall, our results are consistent with a significant rational component in closed-end fund discounts that is related to manager talent. The key to our study is that we account for manager replacement events when analyzing the dynamics of the discount.

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 fund performance surrounding manager replacement. Section 5 uses a logit model to investigate the determinants of manager replacement. Section 6 examines the relation between the NAV performance and the discount change by estimating a dynamic panel data model. Section 7 concludes.

2 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 the "stock return" and call the return on the fund's underlying assets the "NAV-return", denoted by R_t^S and R_t^{NAV} 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,

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

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

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 premium. To exclude the influence of the dividend payment on the level of 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.[6]

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,

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

[6]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.

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.[7] By definition, we have

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

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 NAV returns, discount returns, and manager turnover in a rational world

To motivate our empirical tests, we consider the relations between the NAV return, discount return, and manager turnover in a rational world, in the presence of a well-functioning governance system. 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. Therefore, we have the following testable predictions:

Hypothesis I: *Past NAV-returns are negatively correlated with the probability of manager replacement.*

Hypothesis II: *NAV-returns improve after manager replacement.*

Alternatively, if the replacement of managers happens purely for exogenous reasons (e.g., retirements, mergers, etc.), we would observe no relation between lagged NAV-performance and manager replacement.

The relation between the discount return and manager replacement is more complicated. In a rational world, discounts reflect the market assessment of the fund manager's

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

ability as well as the market assessment of the likelihood that the manager will be replaced. When the market receives a first poor signal, it revises downwards its posterior belief about managerial ability, leading to an increase in the discount. However, once additional unfavorable information is obtained, for example, in the form of further low NAV-returns, the discount may stop responding to the poor performance since that manager is expected to be replaced.

The discussion above implies that although the discount return in early periods, when the replacement is still a remote possibility, should predict management replacement, the discount return in periods immediately preceding replacement may not help to predict it. We state this prediction as our third empirical hypothesis.

Hypothesis III: *Discount returns in early periods are negatively related to the probability of future manager replacement, but discount returns in the period immediately prior to replacement have no predictive power.*

Our discussion above also implies that, in a rational world, the dynamic relation between the discount return and the NAV return will be influenced by the manager replacement event. In the absence of manager replacement, if investors are fully rational, then there should be a positive relation between past NAV-returns and current discount returns, because high NAV-return leads to an increase in the market's assessment of managerial ability (the learning effect). There should also be a positive relation between past discount returns and current NAV returns due to the rational expectation of fund investors (the rational expectation effect). However, both relations may become weaker 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 little 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. We state this conjecture as our fourth hypothesis.

Hypothesis IV: *In the absence of manager replacement, there is two-way Granger* *causality between discount returns and NAV returns; In the periods surrounding manager replacement, the dynamic relation between discount returns and NAV returns 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 1985 to 2002 period. This database is constructed from two sources. First, we obtain the investment objective, weekly share price and net asset value, monthly size, annual expense ratio, 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 added back to the NAV to calculate the weekly pre-expense NAV-return. 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 Lipper database covers the period from January 1, 1985 to December 31, 2002, while the Morningstar manager database covers the period from January 1, 1985 to July 31, 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. The Morningstar data also cover U.S. open-end funds, which allows us to examine the extent to which closed-end fund managers are also involved in the management of open-end funds.

We adopt the following sample selection procedure. We start with all funds in the Lipper database. First, we exclude fund-years without dividend, total net asset, and expense ratio data; 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 501 Lipper funds after these three steps. Finally, we exclude funds that cannot be matched to the Morningstar manager database. Our final sample consists of 446 funds, each with, on average, 566 weekly return observations.[8] Among them, 88 cease to exist before the end of 2002.

[Table 1 about here.]

According to the Lipper classification system, the 446 funds in our final sample are classified into four broad categories: Domestic Equity, Taxable Bond, Municipal Bond, and International Equity. Each category is further divided into several sub-groups according to the investment objectives of funds.[9] 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. Almost one half (213) of our sample consists of municipal bond funds. Domestic equity (47) and international equity funds (63) together constitute about one quarter of the sample. 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 two funds in the Global Fund group to 46 funds in the General Muni Debt Fund (Leveraged) group.

[Table 2 about here.]

3.2 Fund characteristics

Table 2 summarizes various fund characteristics for five sample years, 1985, 1990, 1995, 2000, 2002, and for the whole sample period. For each sample year, we report the 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.

[8] The 55 unmatched funds do not display any systematic differences from the remaining 446 in returns, discount levels, or other fund characteristics.

[9] A detailed description of the Lipper fund classification system can be found at www.lipper.com.

Some notable features emerge from the table. For instance, equity funds tend to 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 whole period are close to zero for all types of funds, they can generate big losses or gains for shareholders during shorter periods. For example, international equity funds generated an average discount return of -28.65% during 1990. Even with bond funds, discount changes can have a significant impact – the average discount return for taxable bond funds is over 11 percent during 2000. These findings highlight the importance of studying the dynamics of discounts.

3.3 Manager characteristics

Table 3 summarizes manager characteristics for our funds at the end of 5 sample years, as well as over the entire sample period. Panel A reports the average manager tenure, in years, across funds in each category and for the entire sample. For a team-managed fund, the manager tenure is calculated as the average tenure of all active managers during a given year. Note that managers of domestic equity funds have a substantially longer tenure than managers in other fund categories. Also, since 1990, there is a tendency toward longer manager tenure in all fund categories. Panel B reports the average size of the management team, i.e., the average number of managers who are associated with a specific fund. The panel shows that taxable bond funds tend to have a larger management team than other funds. There is also a tendency toward larger management teams over time. For example, from 1985 to 2002, the average number of managers for each domestic equity fund has grown steadily from 1.08 to 1.64.

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.

[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 half of the managers of a given fund are replaced by one or more new managers. 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, we impose additional restrictions: 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, fund data, including at least 40 weekly return observations each year, must be available during the two-year period prior to the replacement. These conditions are imposed since we wish to build a pre-replacement record for the replaced manager(s). Based on these criteria, we identify a total of 260 manager replacement events in our sample. These events occur across a total of 196 funds. Panel A of Table 4 displays the distribution of the 260 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.[10]

[10]In our sample, only 11 out of the 196 funds had a manager replacement event followed by fund ter-

[Table 4 about here.]

4 Fund performance and discounts surrounding manager replacement events

Both Hypotheses (III) and (IV) 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. To establish this, we analyze the pattern of NAV returns and discounts surrounding manager replacement events.

Hypothesis I postulates that manager replacement is preceded by poor NAV returns, while Hypothesis II postulates that these returns will improve during the following period. To test these hypotheses, we choose an event window of four years and examine the fund performance during these four years 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). We measure abnormal returns for an event-fund as the difference in returns between the event-fund and the equal-weighted fund category to which the fund belongs. For each event fund, we calculate the NAV-return, discount return, and stock return, as well as average discount levels and expense ratios during each year, and then subtract equal-weighted category means during the same period. Funds with less than 40 weekly observations during a specific year are excluded from that period.[11]

Panel A of Table 5 reports the resulting measures, as well as their statistical significance, averaged across all 260 replacement events in our sample. Panels B through E report the same statistics for each fund category. The last two columns report the average difference between pre- and post-replacement category-adjusted statistics across funds.

[Table 5 about here.]

mination within two years. In unreported tests, we find that the effect of fund termination on our results is negligible.

[11]This leads to a smaller number of funds in year +1 and year +2. Among the 38 events that are not included in computing the year +2 statistics, 27 occur either in 2001 or 2002.

The results in Table 5 support both hypothesis I and hypothesis II. Specifically, during year -1, event funds underperform their category averages by 2.85 percent in NAV return and by 2.69 percent in stock return. Further, both the NAV-return and the stock return reverse following manager replacement. During year +1, new managers significantly outperform the category average by 1.94 percent in NAV-returns , and by 2.01 percent in stock returns. This outperformance seems to be a short-run effect: during year +2, the category-adjusted NAV- and stock returns are no longer significant. Thus, Table 5 provides some evidence for a well-functioning closed-end fund governance, since poorly performing managers are replaced. However, the outperformance of new managers, relative to their peers, suggests that some entrenchment may exist among seasoned managers.

Additional insights can be gained by looking at the disaggregated data (Panels B through E). Except for taxable bond funds, NAV returns and stock returns improve significantly after manager replacement. The improvement is particularly pronounced for international equity funds.[12] Although the performance of taxable bond funds appears worse, the difference between year -1 and +1 is insignificant.

The improvement of NAV performance after manager replacement is accompanied by an increased discount return. For the 222 event funds that have data for all four years, the category adjusted discount return is 1.38% higher during years +1 and +2 than during years -1 and -2. This clearly indicates that discounts and portfolio performance are closely related. Another notable feature of the discount return is observed in domestic funds: during year -2, all domestic investment categories exhibit negative discount returns, while during year -1 their discount returns are much closer to zero. This finding is consistent with the conjecture that early discount returns reflect learning about poor manager talents, while later discount returns reflect investor anticipation that the poor manager will be replaced, as postulated by Hypothesis III.

The pattern of the discount of domestic equity funds is particularly interesting. During

[12]However, international equity funds have widely diverging strategies, and their return volatility is extraordinarily high. So these results should be viewed with caution. It is possible that funds replacing international managers could share some common characteristics, such as investing heavily in an underperforming region.

year -2, as the NAV return of event funds underperforms by 8.16%, their discount return underperforms by -2.54%.[13] However, during year -1, while the NAV return further underperforms by 3.29%, the discount return does not follow this trend. Instead it exhibits an overperformance of 1.35%, indicating that investors may have already anticipated, or been informed about, the forthcoming manager replacement. After the replacement, as the NAV performance improves, the discount return of domestic equity event funds continues to outperform those of their peer groups. Altogether, during the two years after replacement, the category-adjusted discount return of domestic equity event funds outperforms the previous two years by 6.01%. This indicates that manager replacement in domestic equity funds not only has a strong impact on NAV performance, but also has a significant effect on fund discounts.

The discount return of international equity funds is more difficult to explain. Neither is the pre-replacement bad NAV performance accompanied by a low discount return, nor is the subsequent dramatic performance improvement associated with a corresponding improvement in discount returns. The lack of a link between NAV performance and discount changes in international funds may have to do with fact that their fund shares and underlying assets are traded on different markets.[14]

[Figure 1 about here.]

In order to have a clearer picture of the fund performance and discounts surrounding manager replacement, we plot in Panel A of Figure 1 the average category-adjusted discount level, as well as the cumulative category-adjusted NAV return, discount return and stock return over the four-year event window for the 260 manager replacement events.

The most prominent feature of this figure is a steadily decreasing cumulative peer-adjusted NAV-return of the event funds prior to a manager replacement. At the time of

[13]While not shown in the table, the average category-adjusted discount level increases from -0.26% during week -105 to 3.01% during week -53. Note that according to the definition by Equation (5), the discount return is more (less) sensitive to discount changes when the initial discount is high (low), therefore the discount return is not exactly the same as the decrease in discounts.

[14]See Jain, Xia, and Wu (2005) for an interesting analysis of the discount of closed-end country funds.

replacement, the cumulative category-adjusted NAV return is about -4 percent. Given that more than two-thirds of the replacement events occur in bond funds, this underperformance is quite large. Note, also, that the NAV-performance reverses following manager replacement. While the good NAV performance following manager replacement does not completely offset the low pre-replacement NAV returns, much of the underperformance is eliminated. These striking patterns strongly support that underperforming managers are disciplined (Hypothesis I and II).

The patterns of the discount level and discount returns are less clear. The discount level of the event funds is slightly lower than category averages throughout the event window, which might reflect that investors assess that these funds have better governance structures than their peers. Further, these event funds experience a slightly negative category-adjusted cumulative discount return prior to manager replacement, and a slightly positive category-adjusted cumulative discount return after replacement.

[Figure 2 about here.]

[Figure 3 about here.]

The lack of a clear time-series pattern of discounts in the whole sample is likely due to the irregular discount behavior of international equity funds. Therefore, we separately plot domestic funds (Figure 2) and international funds (Figure 3). Consistent with the results reported in Table 5, the discount of international funds does not seem to reflect the dramatic change in portfolio performance around the manager replacement. However, the discount of domestic event funds does exhibit a very interesting pattern. The category-adjusted discount starts at about -1.7% at the beginning of the four-year event window, but steadily increases during the first one and a half years to about -0.5%, resulting in a negative adjusted discount return during that period. It stops increasing at about 20 weeks before manager replacement, indicating an anticipation effect. This pattern clearly suggests that discount changes reflect learning about poor manager talents as well as anticipation of future manager replacement.

Considering that funds within the same broad category may still have different investment objectives and thus be exposed to different risk factors, we also adjust the performance of the event funds by the equal-weighted average of all funds with the same investment objective. The advantage of this alternative benchmark is that it better controls for the objective-specific risk factors. The disadvantage is that the number of comparable funds becomes rather small, or even zero in some cases. The objective-adjusted performance and discounts are plotted in Panel B of each figure. They shows a similar pattern as the category-adjusted measures do, although the magnitude of pre-replacement under-performance and the following recovery is less dramatic. This indicates that only a small part of the pre-replacement under-performance and the subsequent improvement can be attributed to market movement in specific market sectors.

Overall, our simple event statistics presented so far indicate a strong effect of manager turnover on NAV returns, consistent with the view that managers affect the performance of funds and that, therefore, manager replacement is an important event in studying the dynamics of the discount. In the next section, we undertake more comprehensive multivariate tests that further explore this idea.

5 The relation of discounts and NAV returns with 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, which consists of funds not experiencing manager replacement. This control sample is chosen in the following way: for each fund that experiences a manager replacement during week t, we identify all funds having the same Lipper investment objective, but not experiencing any manager change (including the departure or addition of a manager to an existing team) over weeks $t-104$ to $t+104$. Further, we require that each control fund should have at least 40 weekly return observations during each of the two years preceding the event date. Finally, to generate a control sample without overlapping observations across replacement events occurring at roughly the same time, we exclude, from the control sample for a given event, those funds that have been selected as a control for another replacement happening during the prior year. This procedure enables us to construct a control sample of 836 observations for the 260 replacement events. For some events, no control funds are available. The distribution of control observations across fund categories and time periods are displayed in Panel B of Table 4.

We are mainly interested in how past performance, measured by category-adjusted NAV-, discount- and stock-returns, is related to the probability of manager replacement. 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. We also consider several control variables, which include the discount level, fund size, expense ratio, all category-adjusted and standardized, and three category dummies.

Table 6 displays the results for several specifications of the logit regressions. Model 1 tests the predictive power of the lagged stock return, which is the sum of NAV-return and discount return minus expense ratio. Models 2 and 3 test the predictive power of the two most important components of the stock return, i.e., the NAV-return and discount return, respectively. Model 4 uses the NAV return and discount return jointly as explanatory variables. Model 5 extends model 4 by controlling for fund size, expense and discount level. In all the five regressions, three category dummies are included to control for the category-specific effect. The table reports the estimated coefficients, Z-statistics (asymptotically normal), likelihood ratio statistics (asymptotically χ^2), and pseudo R^2. The Z-statistic tests the null hypothesis that an individual explanatory variable is not significant, while the likelihood ratio statistic tests the null hypothesis that all the explanatory variables are jointly insignificant.

[Table 6 about here.]

The logit regressions not only confirm prior results reported in Table 5, but also yield important further insights. The hypothesis that all explanatory variables are jointly insignificant is rejected for all models, although the pseudo R^2 is low.[15] Model 1 shows that the (standardized category-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 20.1 percent in the odds ratio of replacement versus non-replacement. Further, model 2 shows that the NAV-return predicts manager replacement only during year -1, while model 3 shows that the discount return predicts manager replacement only during year -2. 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 relation for the year -1 stock return is mainly driven by the NAV-return. This result remains unchanged when past NAV-returns and discount returns are considered jointly (model 4), or when more control variables are included (model 5). Note that both the magnitude and the statistical significance of estimated coefficients are robust to changes in the 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 Hypothesis I. Also, the relation between discount returns and manager replacement supports our conjecture that the dynamics of the discount reflect not only investor beliefs about portfolio manager ability, but also the anticipation of manager turnover (Hypothesis III) – thus, indicating a rational component in discount dynamics. They do not support the view that

[15] The poor fit is not surprising, given that manager replacements happen for a variety of reasons unrelated to performance. For example, a manager may leave to retire.

the movement of discounts is purely driven by investor sentiment. The fact that discount returns predict manager replacement one year ahead of NAV returns 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. When investors gather negative information about managerial ability during year -2, discounts tend to widen, since manager replacement is still a remote possibility. During year -1, the poor NAV return provides further information about managerial ability, and investors become increasingly confident that the manager will be replaced. This anticipated replacement effect offsets the learning effect, so that the discount does not increase further during year -1. This results in an insignificant relation between discount returns during year -1 and manager replacement.

Model 5 also shows the explanatory power of the discount level and expense ratio for the probability of manager replacement. The negative relation between the discount level and manager replacement is somewhat surprising, but may merely reflect the problems with using discount levels, rather than returns, to characterize funds. Specifically, even in a purely rational world, the level of discounts is influenced by many fund-specific factors other than managerial ability, such as the dividend ratio and liquidity of fund assets. Such non-performance fund characteristics can be quite heterogeneous within a fund category, making the category average an imperfect benchmark for a fund's discount *level*. By contrast, the category-adjusted discount *return* is much less sensitive to the choice of peer funds, as long as that fund's characteristics do not change substantially over time.

The positive relation between expense ratio and the probability of manager replacement is easy to interpret. A higher management fee 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.

[Table 7 about here.]

[Table 8 about here.]

We further divide our sample into domestic funds and international funds, and rerun the logit regressions. Tables 7 and 8 present the results for these two subsamples, respectively. The results obtained for the domestic fund sample are very similar to those for the full sample. However, our logit models exhibit little power in predicting manager replacement in international equity funds. The null hypothesis that all explanatory variables are jointly insignificant cannot be rejected at the five-percent level for all five model specifications we consider. The lack of predictability of manager replacement in international funds may be due to the high heterogeneity of funds within this category, and to the resulting difficulty in benchmarking the performance of such managers. As Parrino (1997) has found, poor managers are more difficult to identify and more costly to replace in heterogenous industries than in homogeneous industries.

As a robustness check, we also recompute our regressions using explanatory variables measured as standard deviations from the investment-objective (rather than category) averages.[16] The results for the full model (model 5) are presented in Table 9. It can be seen that our main results remain unchanged. However, there are also some important differences. First, the NAV return in year -1 is highly significant (at the 1% level) in (negatively) predicting manager replacement among international equity funds. Second, discount levels no longer predict manager replacement, while fund size positively predicts replacement, consistent with the finding of Warner, Watts, and Wruck (1988) for industrial firms. These results suggest that investment objective classifications may provide better benchmarks than category classifications, especially for the international funds.

[Table 9 about here.]

[16]This approach results in the loss of four replacement event observations, due to these funds being the only ones within their investment objective group at the date that the replacement occurs.

6 The dynamic relation between NAV and discount returns

Our previous results suggest that the dynamics of discounts reflect investor anticipation of future events. 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 the market and elsewhere, about manager skills, then an decrease in 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 Hypothesis IV.

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.[17] 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, there two variable are used in Equation (6) as the left-hand side variables one after another. We call the former specification the NAV return equation, and the latter

[17]While it is not essential that the lag length of y equals that of x, we follow the typical practice and assume that they are identical. This implies that the length of one variable may be unnecessarily long, but the presence of additional lags with zero coefficients does not affect the behavior of the system.

the discount return equation. Both returns are measured on a calender year basis and as before, transformed into standardized deviations from contemporaneous category or objective means.

It is well known that due to the presence of the individual effect and the lagged dependent variables on the right-hand side, the standard Least Square Dummy Variable (LSDV) 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)). A typical response to this is to first eliminate the individual effect α_i by first-differencing and 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)).[18] 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 $\Delta y_{it} = y_{it} - y_{i,t-1}$.

We use the one-step GMM estimator developed by Arellano and Bond (1991) to estimate the parameters in Equation (7).[19] 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,

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

Equations (8) represent a set of moment conditions that can be used to identify the parameters.[20] Since the consistency of this estimator relies crucially on the assumption of a

[18]This is necessary because the OLS estimator for this differenced equation is inconsistent, since the error term $u_{it} - u_{it}$ is correlated with the regressor $y_{i,t-1} - y_{i,t-2}$ 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.

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

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

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 Equations (7), since the Arellano-Bond test suggests that this lag length leads to a white noise error term in both the NAV return and the discount return equations – thus ensuring the consistency of the Arellano-Bond estimator.

[Table 10 about here.]

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. If there is a manager replacement (as defined in Section 3) in fund i during year t, then the observation with Δy_{it} as the dependent value is included in the replacement sample. Otherwise it is included in the non-replacement sample. Since $p = 2$, it takes four consecutive annual returns to form one observation for our estimation. This leads to 220 observations in the replacement sample and 3,181 observations in the non-replacement sample when returns are adjusted by category means. The number of observations is slightly smaller when returns are adjusted by investment objective means, since the adjustment is not possible when there is only one fund in an objective group.

Table 10 reports the regression results for Equations (7). The first two columns present results obtained from category-adjusted returns, while the last two present results obtained from objective-adjusted returns. 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.

Note that the results for category-adjusted returns and objective-adjusted returns are quite similar. In the non-replacement sample (Panel A), 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 0.196 on lagged change in NAV return in columns two and four). 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 during year t (see the coefficients of 0.084 and 0.055 on lagged change in discount return in columns one and three, respectively). 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 that a negative autocorrelation in discount returns as well as in NAV returns.

Interestingly, results are quite different for the replacement sample (Panel B). As discussed previously, when there is a manager replacement during year t, past NAV performance will provide less information about future 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 cannot be rejected according to the Wald test, although the coefficient of the discount return lagged one year is significant at the 5% level according to the Z-statistic in the NAV return equation. The market seems to have more difficulty in forecasting fund performance when the fund is undergoing a manager turnover.

We note that 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 Table 10. However, 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 Table 11. All previous results remain unchanged, except that the negative autocorrelation in discount returns becomes weaker. This 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 lagged change in discount level shown in columns two and four). Interestingly, while past discount returns positively predict future NAV returns in the absence of manager replacement (Panel A), past discount levels do not. This indicates, again, that discount changes are more informative than discount levels.

[Table 11 about here.]

To summarize, our dynamic panel data analysis provides strong support for Hypothesis IV. 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 portfolio performance of a fund. 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. To understand the likely impact of such an event, we must, in turn, understand the efficiency of labor markets for these managers. For instance, are fund managers replaced after poor performance, or are they so entrenched that the management company cannot take such actions? Do successful managers generally move to another fund in order to capture the increased value of their human capital?

In this paper, we find that closed-end funds exhibit effective internal governance, in that underperforming managers are replaced. 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 learn from past fund performance and update their assessment of the manager accordingly, but also exhibit an ability to forecast the future performance of the manager. This two-way Granger causality disappears 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 example 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. Future research that endogenizes such actions will undoubtedly bring new insights to the closed-end fund discount puzzle.

References

Anderson, T. W., and Cheng Hsiao, 1981, Estimation of dynamic models with error components, *Journal of American Statistical Association* 76, 589–606.

Arellano, Manuel, and Stephen Bond, 1991, Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations, *Review of Economic Studies* 58, 277–297.

Barclay, Michael, Clifford Holderness, and Jeffrey Pontiff, 1993, Private benefits from block ownership and discounts on closed-end funds, *Journal of Financial Economics* 33, 263–291.

Berk, Jonathan B., and Richard Stanton, 2005, Managerial ability, compensation, and the closed-end fund discount, Working paper, U.C. Berkeley.

Chay, Jong-Bom, and Charles Trzcinka, 1999, Managerial performance and the cross-sectional pricing of closed-end funds, *Journal of Financial Economics* 52, 379–408.

Cherkes, Martin, Jacob Sagi, and Richard Stanton, 2005, Liquidity and closed-end funds, Working paper, Princeton University.

Dimson, Elroy, and Carolina Minio-Kozerski, 1999, Closed-end funds: A survey, *Financial Markets, Institutions and Instruments* 9, 1–41.

Ding, Bill, and Russ Wermers, 2005, Mutual fund performance and governance structure: The role of portfolio managers and boards of directors, working paper, University of Maryland.

Fredman, Albert, and George Cole Scott, 1991, Investing in closed-end funds: Finding value and building wealth, New York Institute of Finance, New York.

Gemmill, Gordon, and Dylan Thomas, 2002, Noise trading, costly arbitrage, and asset prices: Evidence from closed-end funds, *Journal of Finance* 57, 2571–2594.

Holtz-Eakin, Douglas, Whitney Newey, and Harvey S. Rosen, 1988, Estimating vector autoregressions with panel data, *Econometrica* 56, 1371–1395.

Investment Company Institute, 2003, Mutual fund fact book 2003, www.ici.org.

Jain, Ravi, Yihong Xia, and Matthew Qianli Wu, 2005, Market segmentation, liquidity spillover, and closed-end country fund discounts, Working paper, University of Pennsylvania.

Khorana, Ajay, 1996, Top management turnover: an empirical investigation of mutual fund managers, *Journal of Financial Economics* 40, 403–427.

Lee, Charles M.C., Andrei Shleifer, and Richard H. Thaler, 1990, Anomalies: Closed-end mutual funds, *Journal of Economic Perspectives* 4, 153–164.

Lee, Charles M.C., Andrei Shleifer, and Richard H. Thaler, 1991, Investor sentiment and the closed-end fund puzzle, *Journal of Finance* 46, 76–110.

Nickell, Stephen, 1981, Biases in dynamic models with fixed effects, *Econometrica* 47, 1417–1426.

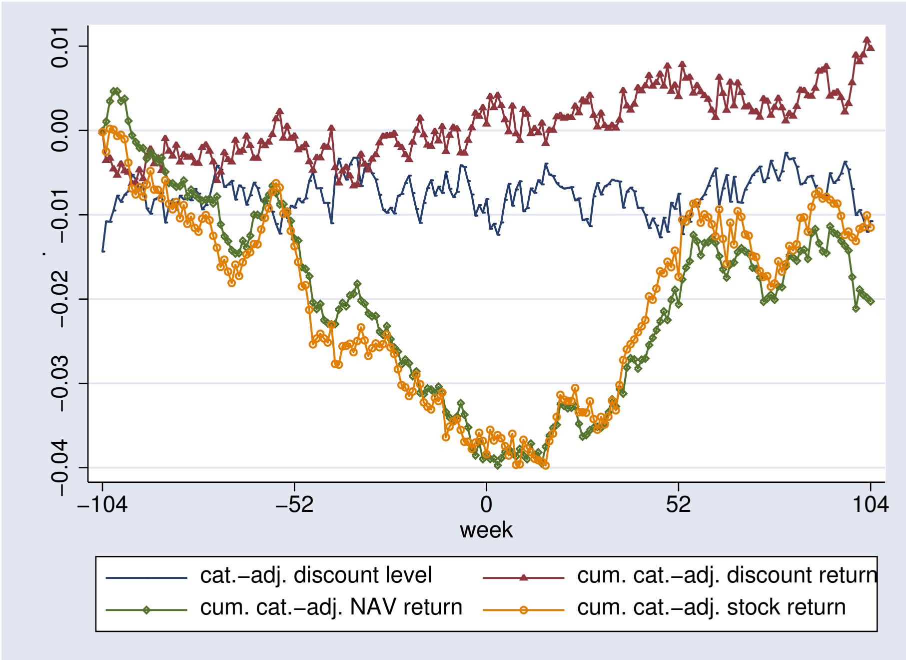
Parrino, Robert, 1997, CEO turnover and outside succession: A cross-sectional analysis, *Journal of Financial Economics* 46, 165–197.

Pontiff, Jeffrey, 1995, Closed-end fund premia and returns: Implications for financial market equilibrium, *Journal of Financial Economics* 37, 341–370.

Ross, Stephen A., 2002, Neoclassical finance, alternative finance and the closed end fund puzzle, *European Financial Management* 8, 129–137.

Seltzer, David Fred, 1989, Closed-end funds: Discounts, premiums and performance, Ph.D. thesis, University of Arizona.

Warner, Jerold, R. Watts, and K. Wruck, 1988, Stock prices and top management changes, *Journal of Financial Economics* 20, 461–492.



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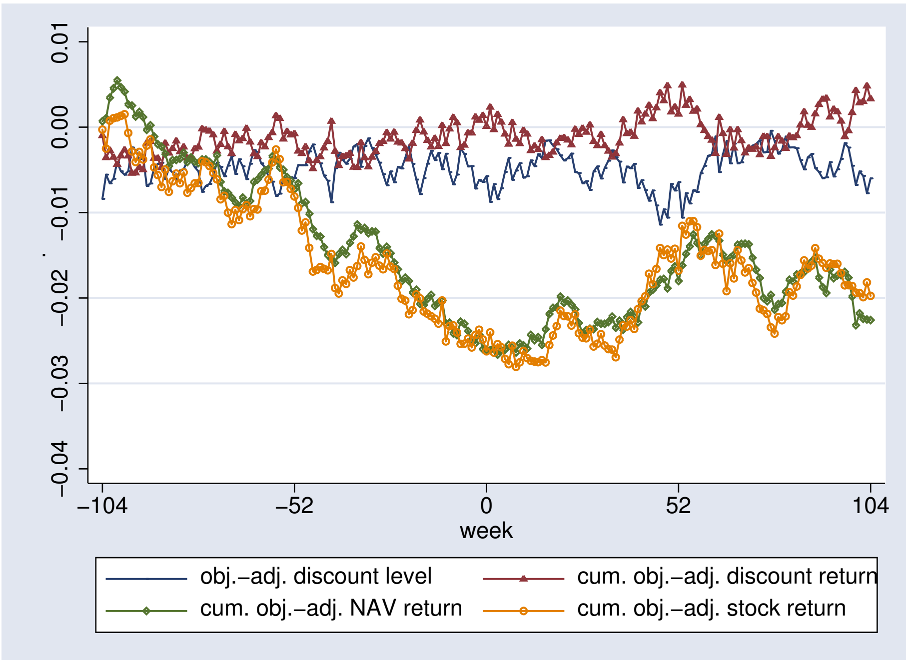
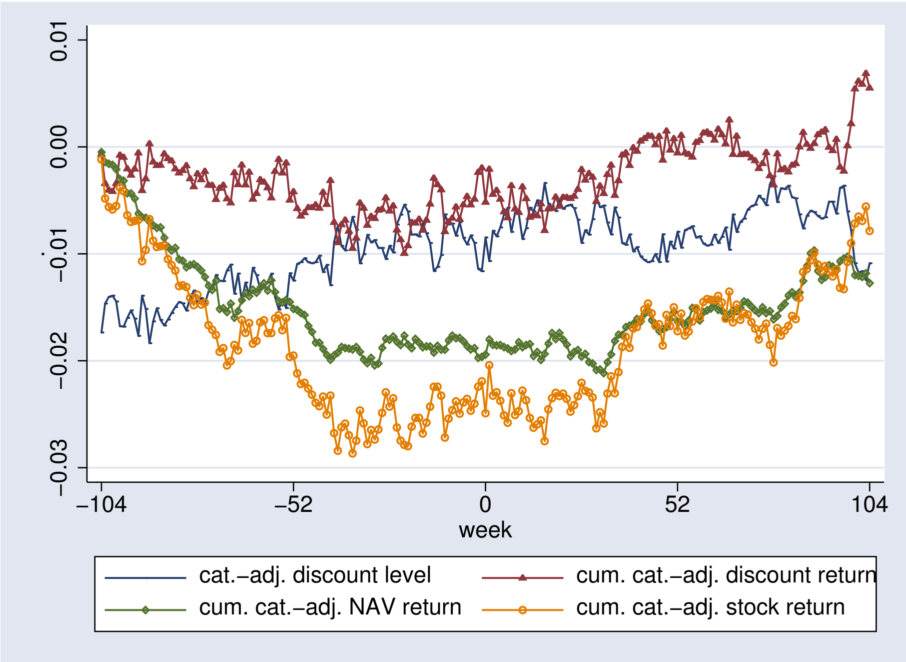


(B)

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

Panel A plots the average discount level, and cumulative NAV return, discount return, and stock return, all adjusted by the mean of the peer funds within the same category, over the four-year event window for 260 replacement events. Panel B plots the same statistics adjusted by the mean of peer funds with the same investment objective.



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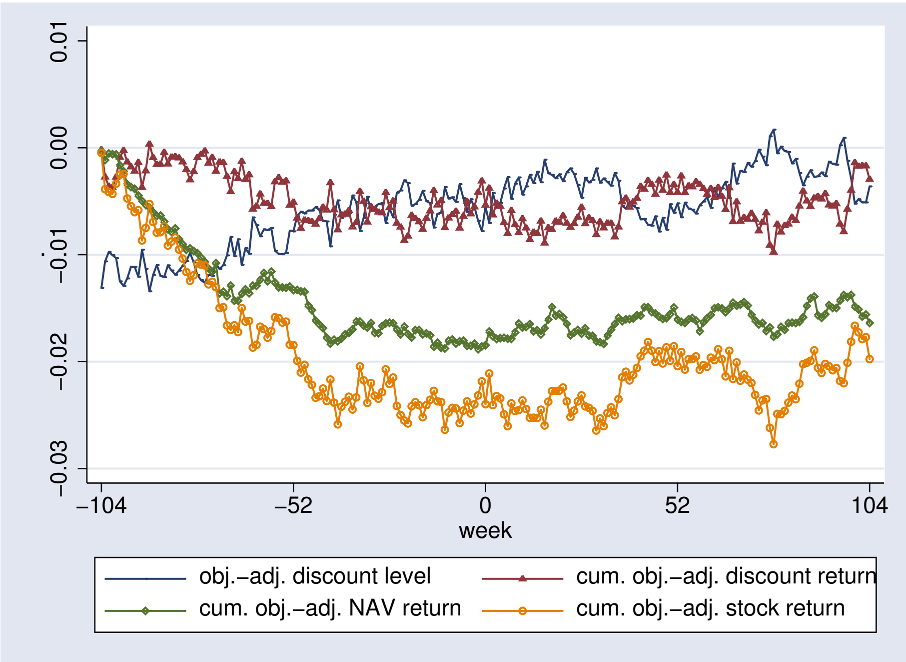

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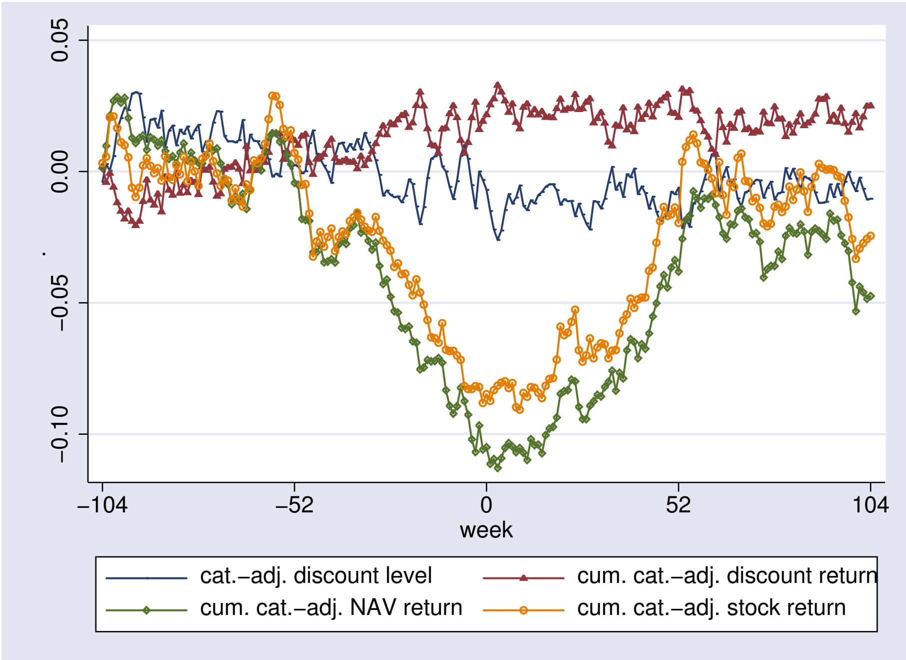
Figure 2: **Fund performance surrounding manager replacement: domestic funds**

Panels A plots the average discount level as well as the cumulative NAV return, discount return and stock return, all adjusted by the mean of peer funds within the same category, for 202 manager replacement events among domestic funds. Panels B plots the same statistics adjusted by the mean of peer funds with the same investment objective.



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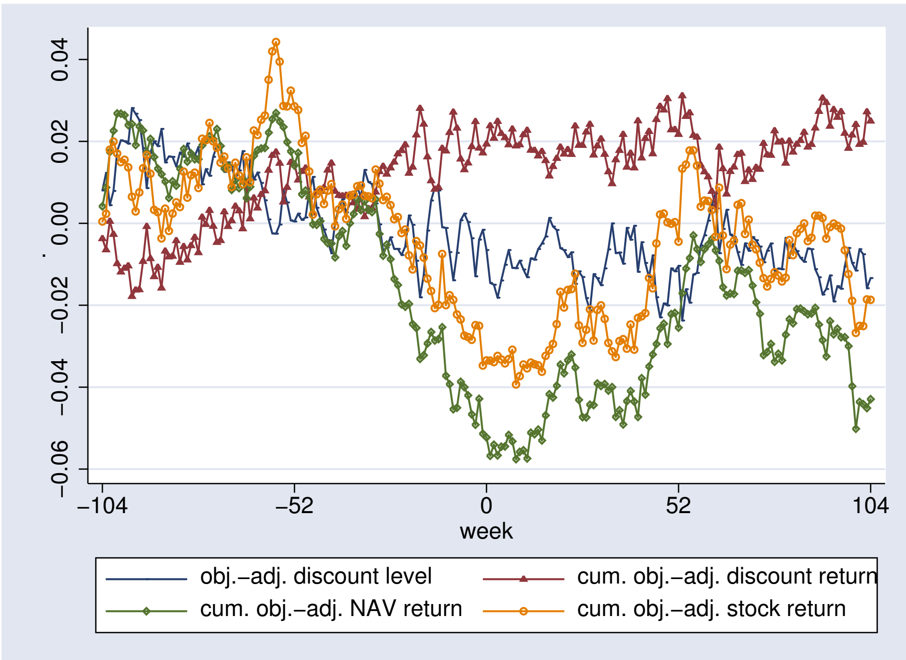

(B)

Figure 3: **Fund performance surrounding manager replacement: international equity funds**

Panels A plots the average discount level as well as the cumulative NAV return, discount return and stock return, adjusted by the mean of peer funds within the same category, for 58 manager replacement events among international equity funds. Panel B plots the same statistics adjusted by the mean of peer funds with the same investment objective.

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 funds. Detailed definitions of investment objectives can be obtained from www.lipper.com. Our matched sample consists of 446 funds, each with, on average, 566 weekly return observations.

Fund Category	Investment Objective	Number
Domestic Equity	Core Funds	15
(47 Funds)	Growth Funds	8
	Sector Equity Funds	18
	Value Funds	6
Taxable Bond	Adjustable Rate Mortgage Funds	5
(123 Funds)	Corporate Debt Funds BBB-Rated Funds	18
	Flexible Income Funds	14
	General Bond Funds	11
	General U.S. Government Funds	4
	General U.S. Government Funds (Leveraged)	5
	High Current Yield Funds	9
	High Current Yield Funds (Leveraged)	22
	Loan Participation Funds	3
	U.S. Mortgage Funds	13
	U.S. Mortgage Term Trust Funds	19
Municipal Bond	California Insured Municipal Debt Funds	8
(213 Funds)	California Municipal Debt Funds	19
	Florida Municipal Debt Funds	12
	General and Insured Muni Funds (Unleveraged)	18
	General Muni Debt Funds (Leveraged)	46
	High Yield Municipal Debt Funds	12
	Insured Muni Debt Funds (Leveraged)	23
	Michigan Municipal Debt Funds	5
	Minnesota Municipal Debt Funds	5
	New Jersey Municipal Debt Funds	10
	New York Insured Municipal Debt Funds	11
	New York Municipal Debt Funds	15
	Other States Municipal Debt Funds	18
	Pennsylvania Municipal Debt Funds	11
International Equity	Eastern European Funds	4
(63 Funds)	Emerging Markets Funds	4
	Global Funds	2
	Latin American Funds	10
	Misc Country/Region Funds	5
	Pacific Ex Japan Funds	21
	Pacific Region Funds	6
	Western European Funds	11

Table 2: **Summary statistics**

This table summarizes various fund characteristics for 5 sample years, 1985, 1990, 1995, 2000, 2002, and for the whole sample period. For each sample year, we report the total number of funds as well as the average: end-of-year size (measured by 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 the corresponding year are included. Statistics for the whole sample period are averages over all fund-years.

		1985	1990	1995	2000	2002	All Years
No. of funds	All Funds	25	161	405	389	360	446
	Domestic Equity	5	28	38	40	40	47
	Taxable Bond	20	68	110	100	89	123
	Municipal Bond	0	38	196	194	183	213
	International Equity	0	27	61	55	48	63
TNA ($ million)	All Funds	145.12	227.70	239.81	254.40	236.00	243.96
	Domestic Equity	327.84	241.03	323.62	438.34	315.79	346.76
	Taxable Bond	99.44	233.59	274.49	277.08	242.17	264.03
	Municipal Bond		287.68	218.60	230.30	245.93	229.88
	International Equity		114.61	193.24	164.42	120.23	165.97
Discount (%)	All Funds	1.40	5.74	8.43	8.87	5.62	5.34
	Domestic Equity	4.27	11.48	9.09	9.96	9.22	8.79
	Taxable Bond	0.68	5.94	7.60	3.28	1.39	3.31
	Municipal Bond		-0.01	9.48	8.62	4.87	4.87
	International Equity		7.41	6.18	19.18	13.31	8.10
Expense (%/year)	All Funds	0.92	1.25	1.19	1.23	1.29	1.20
	Domestic Equity	1.12	1.34	1.37	1.42	1.81	1.39
	Taxable Bond	0.87	1.16	1.01	1.04	1.16	1.03
	Municipal Bond		0.92	1.08	1.08	1.03	1.04
	International Equity		1.84	1.77	1.97	2.09	1.89
NAV return (%/year)	All Funds	24.46	-2.16	17.93	3.79	3.94	7.37
	Domestic Equity	24.13	-8.04	24.22	4.09	-18.00	9.32
	Taxable Bond	24.54	-0.95	20.26	1.51	3.40	7.77
	Municipal Bond		6.82	21.55	14.19	11.20	7.74
	International Equity		-11.75	-1.84	-28.96	-4.44	3.98
Discount return (%/year)	All Funds	-0.29	-8.24	0.04	4.07	-0.87	-0.33
	Domestic Equity	-0.84	-4.10	1.07	2.26	-0.99	0.05
	Taxable Bond	-0.15	-5.03	-1.32	11.52	-2.40	-0.27
	Municipal Bond		-2.51	0.42	2.39	-0.90	-0.48
	International Equity		-28.65	0.65	-2.21	2.17	-0.33
Stock return (%/year)	All Funds	23.25	-11.65	16.78	6.64	1.78	5.84
	Domestic Equity	22.17	-13.48	23.92	4.92	-20.80	7.97
	Taxable Bond	23.52	-7.14	17.93	12.00	-0.16	6.47
	Municipal Bond		3.38	20.89	15.50	9.27	6.22
	International Equity		-42.24	-2.96	-33.14	-4.35	1.76

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

This table summarizes the manager characteristics measured at the end of 5 sample years as well as over the whole sample period. Panel A reports the average manager tenure (in years) across funds. For a team-managed fund, the manager tenure is calculated as the average 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 was simultaneously managing, either independently or jointly with others.

	1985	1990	1995	2000	2002	All years
Panel A: Average manager tenure (years)						
All Funds	7.25	3.12	3.89	6.75	7.66	4.80
Domestic Equity	10.84	6.08	6.65	8.89	10.43	7.66
Taxable Bond	5.96	3.16	4.33	7.46	8.24	5.07
Municipal Bond	NA	1.75	3.10	6.15	6.88	4.08
International Equity	1.98	2.30	3.64	6.09	7.81	4.23
Panel B: Average management team size (# persons)						
All Funds	1.33	1.36	1.49.	1.52	1.62	1.47
Domestic Equity	1.08	1.35	1.61	1.63	1.64	1.52
Taxable Bond	1.59	1.54	1.92	2.10	2.26	1.87
Municipal Bond	NA	1.21	1.21	1.22	1.43	1.23
International Equity	1	1.19	1.48	1.49	1.35	1.42
Panel C: Average number of funds managed by a manager						
All Funds	1.36	2.53	4.37	4.06	3.96	3.72
Domestic Equity	1.17	1.69	2.78	2.63	2.75	2.36
Taxable Bond	1.48	2.51	4.17	3.59	3.11	3.32
Municipal Bond	NA	4.94	8.44	7.38	7.65	7.45
International Equity	1.25	1.42	2.13	2.41	1.70	2.01

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 half of the fund managers are replaced by one or more new managers. Panel B reports the distribution of the control sample, which is constructed as follows: For each fund that experiences a manager replacement during week t, we identify those funds that have the same Lipper investment objective but did not experience any manager change over the weeks $t-104$ to $t+104$. Funds without complete data during this period or that are part of the control sample during the year prior to the event are excluded.

	1985-1989	1990-1994	1995-1999	2000-2002	All years
Panel A: Distribution of manager replacement events					
All Funds	7	62	158	33	260
Domestic Equity	2	5	8	6	21
Taxable Bond	4	22	37	8	71
Municipal Bond	0	24	73	13	110
International Equity	1	11	40	6	58
Panel B: Distribution of control funds					
All Funds	22	129	460	225	836
Domestic Equity	6	22	16	36	80
Taxable Bond	15	50	87	38	190
Municipal Bond	0	37	299	126	462
International Equity	1	20	58	25	104

Table 5: **Pre- and post-replacement statistics: category-adjusted**

Panel A reports the average category-adjusted expense, discount, NAV-return, discount return and stock return, as well as their statistical significance according to standard t-statistics, during the four years surrounding the 260 replacement events in our sample. The adjusted discount level in each year is computed as the average over that year. Panels B to E report the same statistics for each fund category. The last two columns of the table report the average difference between the post- and pre-replacement category-adjusted statistics across all event funds, using 2- year and 4-year event windows, respectively. All numbers, except for year and number of observations, are in percent. *, **, *** denote statistical significance at the 10%, 5% and 1% levels respectively.

Year	-2	-1	+1	+2	+1 vs. -1	+2 and +1 vs. -1 and -2
Panel A. Average category-adjusted statistics: full sample						
No. of Obs.	260	260	238	222	238	222
Expense	0.03	0.03	0.02	0.02	-0.02	-0.01
Discount	-0.84*	-0.75	-0.90	-0.75	-0.22	-0.39
NAVreturn	-1.02	-2.85***	1.94**	0.01	5.00***	5.43***
Discount return	-0.34	0.19	0.09	0.49	-0.30	1.38
Stock return	-1.38	-2.69***	2.01**	0.47	4.72***	6.83***
Panel B. Average category-adjusted statistics: Domestic Equity						
No. of Obs.	21	21	19	18	19	18
Discount	0.95	2.02	2.01	1.01	-0.52	-0.73
NAVreturn	-8.16	-3.29*	2.63	2.27	4.74*	11.53**
Discount return	-2.54	1.35	1.49	2.53*	0.18	6.01*
Stock return	-10.69*	-1.78	4.38	4.68	4.96*	17.48**
Panel C. Average category-adjusted statistics: Taxable Bond						
No. of Obs.	71	71	65	58	65	58
Discount	-1.60	-0.56	0.30	1.34	1.00	1.77**
NAVreturn	-1.07	0.49	-0.30	-0.09	-0.63	0.34
Discount return	-0.66	0.01	-0.88	0.35	-1.08	1.26
Stock return	-1.78	0.45	-1.28	0.19	-1.70	1.60
Panel D. Average category-adjusted statistics: Municipal Bond						
No. of Obs.	110	110	98	92	98	92
Discount	-1.86***	-1.78***	-2.12***	-2.38***	-0.54*	-0.61
NAVreturn	-0.50*	-0.69*	0.51**	0.24	1.31***	2.00***
Discount return	-0.36	-0.03	0.66	0.18	0.30	1.33*
Stock return	-0.86*	-0.74	1.17**	0.44	1.63**	3.37***
Panel E. Average category-adjusted statistics: International Equity						
No. of Obs.	58	58	56	54	56	54
Discount	1.40	-0.03	-1.14	-0.79	-0.97	-2.20
NAVreturn	0.63	-10.89***	6.81**	-1.05	18.09***	14.72**
Discount return	0.89	0.40	-.25	0.49	-0.65	0.05
Stock return	1.47	10.57***	6.49*	-0.56	17.49***	14.78**

Table 6: **Predicting manager replacement: full sample**

This table presents the estimated logit regression results for the full sample. The dependent variable is 1 for a total of 260 manager replacement events, and is 0 for a total of 836 control observations matched by calendar time and investment objective. Independent variables include three category dummies as well as stock returns SAR^S_{t-1}, SAR^S_{t-2}; NAV returns SAR^{NAV}_{t-1}, SAR^{NAV}_{t-2}; discount returns SAR^D_{t-1}, SAR^D_{t-2}; and the discount level, *SADis*, fund size (log of the average total net assets, in $ millions), *SASize*, and expense ratio, *SAExp*, during year -1. These variables are all standardized by subtracting the category average and then dividing by the cross-sectional standard deviation within the category. Absolute values of Z-statistics are in parentheses. Also presented are likelihood ratio tests of the null hypothesis that all explanatory variables are jointly insignificant. *, **, *** denote statistical significance at the 10%, 5% and 1% levels respectively.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	-1.374***	-1.360***	-1.356***	-1.379***	-1.394***
	(5.57)	(5.51)	(5.52)	(5.57)	5.62)
$DUMMY_{Bond}$	0.405	0.396	0.375	0.421	0.463
	(1.42)	(1.40)	(1.33)	(1.48)	(1.61)
$DUMMY_{Muni}$	-0.082	-0.104	-0.076	-0.084	-0.109
	(0.31)	(0.39)	(0.28)	(0.31)	(0.40)
$DUMMY_{Intl}$	0.737**	0.726**	0.766***	0.739**	0.736**
	(2.48)	(2.45)	(2.59)	(2.49)	(2.47)
SAR^S_{t-1}	-0.201***				
	(2.73)				
SAR^S_{t-2}	-0.137*				
	(1.93)				
SAR^{NAV}_{t-1}		-0.203***		-0.212***	-0.223***
		(2.60)		(2.68)	(2.77)
SAR^{NAV}_{t-2}		0.099		-0.087	-0.091
		(1.34)		(1.14)	(1.19)
SAR^D_{t-1}			-0.071	-0.070	-0.069
			(0.96)	(0.92)	(0.90)
SAR^D_{t-2}			-0.128*	-0.127*	-0.178**
			(1.73)	(1.72)	(2.31)
SADis					-0.147**
					(2.04)
SAExp					0.147*
					(1.88)
SASize					0.126
					(1.61)
$LR\ \chi^2$	32.79***	31.93***	25.11***	35.20***	44.35***
$PseudoR^2$	0.027	0.027	0.020	0.029	0.037

Table 7: **Predicting manager replacement: domestic funds**

This table presents the estimated logit regression results for the sample of domestic funds. Dependent variable is 1 for a total of 202 manager replacement events, and is 0 for a total of 732 control observations matched by calendar time and investment objective. Independent variables include two category dummies as well as stock returns SAR^S_{t-1}, SAR^S_{t-2}; NAV returns SAR^{NAV}_{t-1}, SAR^{NAV}_{t-2}; discount returns SAR^D_{t-1}, SAR^D_{t-2}; and the discount level, *SADis*, fund size (log of the average total net assets, in $ millions), *SASize*, and expense ratio, *SAExp*, during year -1. These variables are all standardized by subtracting the category average and then dividing by the cross-sectional standard deviation within the category. Absolute values of Z-statistics are in parentheses. Also presented are likelihood ratio tests of the null hypothesis that all explanatory variables are jointly insignificant. *, **, *** denote statistical significance at the 10%, 5% and 1% levels respectively.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	-1.386***	-1.366***	-1.371***	-1.392***	-1.417***
	(5.59)	(5.53)	(5.56)	(5.61)	(5.68)
$DUMMY_{Bond}$	0.398	0.391	0.388	0.424	0.470
	(1.40)	(1.38)	(1.37)	(1.48)	(1.63)
$DUMMY_{Muni}$	-0.073	-0.100	-0.065	-0.073	-0.112
	(0.27)	(0.37)	(0.24)	(0.27)	(0.41)
SAR^S_{t-1}	-0.183**				
	(2.24)				
SAR^S_{t-2}	-0.235***				
	(2.95)				
SAR^{NAV}_{t-1}		-0.191**		-0.200**	-0.237***
		(2.17)		(2.25)	(2.59)
SAR^{NAV}_{t-2}		-0.154*		-0.124	-0.151
		(1.87)		(1.45)	(1.76)
SAR^D_{t-1}			-0.110	-0.081	-0.074
			(1.33)	(0.96)	(0.86)
SAR^D_{t-2}			-0.202**	-0.183**	-0.249***
			(2.41)	(2.17)	(2.86)
SADis					-0.237***
					(2.95)
SAExp					0.208**
					(2.37)
SASize					0.139
					(1.61)
$LR\ \chi^2$	21.25***	18.06***	13.09**	22.98***	38.63***
$PseudoR^2$	0.022	0.019	0.013	0.024	0.040

Table 8: **Predicting manager replacement: international equity funds**

This table presents the estimated logit regression results for the sample of international equity funds. Dependent variable is 1 for a total of 58 manager replacement events, and is 0 for a total of 104 control observations matched by calendar time and investment objective. Independent variables include stock returns SAR^S_{t-1}, SAR^S_{t-2}; NAV returns SAR^{NAV}_{t-1}, SAR^{NAV}_{t-2}; discount returns SAR^D_{t-1}, SAR^D_{t-2}; and the discount level, *SADis*, fund size (log of the average total net assets, in $ millions), *SASize*, and expense ratio, *SAExp*, during year -1. These variables are all standardized by subtracting the category average and then dividing by the cross-sectional standard deviation within the category. Absolute values of Z-statistics are in parentheses. Also presented are likelihood ratio tests of the null hypothesis that all explanatory variables are jointly insignificant. *, **, *** denote statistical significance at the 10%, 5% and 1% levels respectively.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	-0.659***	-0.635***	-0.583***	-0.639***	-0.654***
	(3.81)	(3.72)	(3.55)	(3.71)	(3.75)
SAR^S_{t-1}	-0.312				
	(1.82)*				
SAR^S_{t-2}	0.275				
	(1.66)*				
SAR^{NAV}_{t-1}		-0.220		-0.249	-0.327
		(1.30)		(1.33)	(1.59)
SAR^{NAV}_{t-2}		0.136		0.236	0.178
		(0.79)		(1.24)	(0.87)
SAR^D_{t-1}			0.074	-0.045	-0.077
			(0.45)	(0.25)	(0.41)
SAR^D_{t-2}			0.145	0.210	0.277
			(0.89)	(1.18)	(1.45)
SADis					0.217
					(1.10)
SAExp					-0.005
					(0.03)
SASize					-0.029
					(0.14)
$LR\ \chi^2$	5.37*	2.05	0.88	3.62	4.90
$Pseudo R^2$	0.025	0.010	0.004	0.017	0.023

Table 9: **Predicting manager replacement: objective-adjusted explanatory variables**
This table presents the estimated logit regression results when all the explanatory variables are transformed into standard deviations from the mean of all funds with the same investment objective. Dependent variable is 1 if a manager replacement occurs and 0 otherwise. Independent variables include three category dummies as well as stock returns SAR^S_{t-1}, SAR^S_{t-2}; NAV returns SAR^{NAV}_{t-1}, SAR^{NAV}_{t-2}; discount returns SAR^D_{t-1}, SAR^D_{t-2}; and the discount level, *SADis*, fund size (log of the average total net assets, in $ millions), *SASize*, and expense ratio, *SAExp*, during year -1. Absolute values of Z-statistics are in parentheses. Also presented are likelihood ratio tests of the null hypothesis that all explanatory variables are jointly insignificant. *, **, *** denote statistical significance at the 10%, 5% and 1% levels respectively.

Variables	All	Domestic	International
Intercept	-1.404***	-1.399***	-0.689***
	(5.64)	(5.62)	(3.91)
$DUMMY_{Bond}$	0.369	0.358	
	(1.29)	(1.25)	
$DUMMY_{Muni}$	-0.091	-0.112	
	(0.33)	(0.41)	
$DUMMY_{Intl}$	0.782***		
	(2.61)		
SAR^{NAV}_{t-1}	-0.269***	-0.190**	-0.661***
	(3.41)	(2.16)	(3.18)
SAR^{NAV}_{t-2}	-0.128	-0.184**	0.047
	(1.63)	(2.07)	(0.25)
SAR^{D}_{t-1}	-0.107	-0.085	-0.321
	(1.31)	(0.96)	(1.47)
SAR^{D}_{t-2}	-0.136*	-0.193**	0.176
	(1.69)	(2.16)	(0.85)
SADis	-0.068	-0.115	0.231
	(0.86)	(1.31)	(1.11)
SAExp	0.231***	0.272***	0.017
	(2.76)	(2.92)	(0.08)
SASize	0.232***	0.261***	0.020***
	(2.86)	(2.94)	(3.18)
$LR\ \chi^2$	49.11***	33.87***	12.80*
$PseudoR^2$	0.041	0.035	0.0612

Table 10: **The dynamic relation between NAV and discount returns**

We run a Granger causality test using the panel of annual discount returns and NAV returns. Parameters are estimated using a one-step GMM procedure developed by Arellano-Bond (1991) for dynamic panel data models. SAR^{NAV} and SAR^{D} denote the standardized NAV return and discount return, respectively. The first two columns present results obtained from standardized category-adjusted returns, while the last two columns present results obtained from standardized objective-adjusted returns. The absolute values of Z-statistics reported in parentheses are based on asymptotic standard errors robust to general cross-section and time-series heteroskedasticity. 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: Non-replacement sample				
	Category-adjusted returns		Objective-adjusted returns	
	ΔSAR_t^{NAV}	ΔSAR_t^{D}	ΔSAR_t^{NAV}	ΔSAR_t^{D}
ΔSAR_{t-1}^{NAV}	-0.138***	0.196***	-0.184***	0.196***
	(4.83)	(7.01)	(5.41)	(7.74)
ΔSAR_{t-2}^{NAV}	-0.030	0.022	-0.051**	0.063***
	(1.30)	(0.97)	(2.51)	(2.70)
ΔSAR_{t-1}^{D}	0.084***	-0.194***	0.055***	-0.191***
	(3.67)	(7.85)	(2.59)	(8.00)
ΔSAR_{t-2}^{D}	0.019	-0.082***	-0.000	-0.086***
	(0.54)	(3.98)	(0.02)	(4.20)
$H0$	$SAR^D \nRightarrow SAR^{NAV}$	$SAR^{NAV} \nRightarrow SAR^D$	$SAR^D \nRightarrow SAR^{NAV}$	$SAR^{NAV} \nRightarrow SAR^D$
χ_2^2	15.26***	52.34***	8.12**	61.33***
Panel B: Replacement sample				
	Category-adjusted returns		Objective-adjusted returns	
ΔSAR_{t-1}^{NAV}	-0.735***	0.027	-0.652***	0.070
	(9.17)	(0.32)	(8.90)	(1.02)
ΔSAR_{t-2}^{NAV}	-0.378***	0.053	-0.378***	0.084
	(6.14)	(0.68)	(6.30)	(1.50)
ΔSAR_{t-1}^{D}	0.106**	-0.666***	0.086	-0.669***
	(2.01)	(9.40)	(1.47)	(9.86)
ΔSAR_{t-2}^{D}	0.054	-0.282***	0.011	-0.277***
	(0.95)	(3.78)	(0.23)	(4.40)
$H0$	$SAR^D \nRightarrow SAR^{NAV}$	$SAR^{NAV} \nRightarrow SAR^D$	$SAR^D \nRightarrow SAR^{NAV}$	$SAR^{NAV} \nRightarrow SAR^D$
χ_2^2	4.23	0.48	2.49	2.40

Table 11: **The dynamic relation between NAV and discount returns after controlling for past discount levels**

We run a Granger causality test using the panel of annual discount returns and NAV returns, 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. SAR^{NAV}, SAR^{D}, $SADis$ denote the standardized NAV return, discount return, and discount level, respectively. The first two columns present results obtained from standardized category-adjusted returns, while the last two columns present results obtained from standardized objective-adjusted returns. The absolute values of Z-statistics reported in parentheses are based on asymptotic standard errors robust to general cross-sectional and time-series heteroskedasticity. 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: Non-replacement sample				
	Category-adjusted returns		Objective-adjusted returns	
	ΔSAR_t^{NAV}	ΔSAR_t^{D}	ΔSAR_t^{NAV}	ΔSAR_t^{D}
ΔSAR_{t-1}^{NAV}	-0.156***	0.145***	-0.198***	0.146***
	(5.74)	(6.33)	(5.84)	(6.70)
ΔSAR_{t-2}^{NAV}	-0.029	0.040**	-0.060**	0.055***
	(1.26)	(2.15)	(2.98)	(2.81)
ΔSAR_{t-1}^{D}	0.111***	0.138	0.070**	-0.033
	(3.68)	(0.53)	(2.48)	(1.29)
ΔSAR_{t-2}^{D}	0.028	0.040**	0.011	-0.002
	(1.13)	(1.97)	(0.51)	(0.09)
$\Delta SADis_{t-1}$	0.085	0.634***	0.042	0.547***
	(1.44)	(13.09)	(0.78)	(12.09)
$H0$	$SAR^{D} \nRightarrow SAR^{NAV}$	$SAR^{NAV} \nRightarrow SAR^{D}$	$SAR^{D} \nRightarrow SAR^{NAV}$	$SAR^{NAV} \nRightarrow SAR^{D}$
χ_2^2	16.82***	40.24***	7.71**	44.95***
Panel B: Replacement sample				
	Category-adjusted returns		Objective-adjusted returns	
ΔSAR_{t-1}^{NAV}	-0.776***	0.019	-0.729***	0.051
	(9.84)	(0.27)	(10.51)	(0.80)
ΔSAR_{t-2}^{NAV}	-0.387***	0.052	-0.408***	0.111**
	(6.62)	(0.81)	(7.09)	(1.98)
ΔSAR_{t-1}^{D}	0.143*	-0.816	0.128	-0.389***
	(1.67)	(0.85)	(1.58)	(4.31)
ΔSAR_{t-2}^{D}	0.074	-0.435	0.026	-0.130*
	(1.35)	(0.63)	(0.40)	(1.77)
$\Delta SADis_{t-1}$	0.077	1.084***	0.180	0.685***
	(0.53)	(6.85)	(1.13)	(4.79)
$H0$	$SAR^{D} \nRightarrow SAR^{NAV}$	$SAR^{NAV} \nRightarrow SAR^{D}$	$SAR^{D} \nRightarrow SAR^{NAV}$	$SAR^{NAV} \nRightarrow SAR^{D}$
χ_2^2	3.02	0.79	3.13	4.02

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