Closed-end Fund Governance, Portfolio Performance, and the Discount*

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Abstract

We examine the determinants closed-end fund manager turnover and the role of fund governance in explaining the dynamics of fund discounts. To accomplish this, we investigate the dynamics of the discount, as well as the net-asset-value (NAV) return of the underlying fund portfolio during the period surrounding manager replacement events. Consistent with the presence of an effective internal governance mechanism, we find that replaced managers underperform their peer groups prior to their replacement and that the fund performance improves after replacement. We also find that the 2-year lagged discount return is negatively related to the probability of manager replacement whereas the 1-year lagged discount return has no predictive power, which indicates not only that the change of discount contains information about managerial ability, and but also that investors rationally infer that poorly performing managers will be replaced. In the U.S. domestic fund sample, we also find that the anticipation of manager turnover changes the relation between discount return and NAV-performance. Overall, our results cast some doubt on the explanation of closed-end fund discounts via entrenched fund managers, but they support the view that fund discounts are related to investors' rational expectations regarding both fund manager's ability and fund management company's future actions.

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 pricing 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 method of valuation of the closed-end fund shares, leading (in most cases) to a large and unexplained discount.

The total economic value of the discount is relatively large, especially in relation to the value of the underlying assets of funds. For example, the median discount of a U.S. domestic-equity closed-end fund at the end of 2002 was roughly 8 percent, which amounts to a discount of about $2 billion out of domestic-equity closed-end fund assets that totalled $26.5 billion. In addition, the presence of such a significant discount seemingly violates the law of one price, where a simple repackaging of securities should conserve value. 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 (see, for example, Seltzer (1989)), the tax overhang of capital gains (Fredman and Scott (1991)), agency problems (Barclay, Holderness, and Pontiff (1993)), and the present

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

value of fees in excess of manager talents (Rosss (2002)), or in excess of additional liquidity benefits provided by closed-end funds (Cherkes (2004)). Although these papers provide useful insights into the static, cross-sectional properties of discounts, none adequately address time-series dynamics. Given the lack of theoretical explanations among the standard finance paradigms, 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.

Recently, Berk and Stanton (2004) develop a rational model that is consistent with the main empirical dynamic features of closed-end fund discounts, as identified by Lee, Shleifer, and Thaler (1990). In particular, the Berk-Stanton model offers an explanation for the empirical observation that closed-end fund shares are issued at (or above) their NAV, then generally move to a discount. The key assumption of their model is that closed-end fund managers, whose abilities to generate excess returns are imperfectly observable, are insured by long-term labor contracts. When a manager is revealed to be talented, he leaves for better terms elsewhere. However, when his lack of talent is revealed, he cannot be fired due to the existence of his long-term contract. Although Berk and Stanton (2004) show that this simple entrenchment assumption is sufficient to generate the primary stylized facts of discounts, it is not clear whether this structure of manager contracts really exists.

Prior research on open-end funds has found that manager replacement tends to be preceded by poor performance and followed by improved performance, which is inconsistent with the assumption of Berk and Stanton (2004).[2] 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 (2004), the response of investor flows to fund performance generates strong incentives for the fund management company to fire underperforming managers. Such a mechanism does not exist in the closed-end fund market; therefore, it might well be the case that closed-end fund managers are entrenched.

[2]See for example, Khorana (1996), Khorana (2001), Chevalier and Ellison (1999a), Chevalier and Ellison (1999b), Hu, Hall, and Harvey (2000), Ding and Wermers (2004).

This paper undertakes an empirical investigation into closed-end fund performance and discounts surrounding manager replacement, using a database covering more than 400 closed-end funds in the U.S. from 1985 to 2002. Our research is motivated by the following considerations. First, we would like to provide an empirical analysis on an important aspect of the internal governance of closed-end funds, i.e., the manager replacement decision. Despite the immense scrutiny attracted by the puzzling existence and dynamics of closed-end fund discounts, we know surprisingly little about to what extent closed-end fund managers are disciplined by the fund's internal governance system. Indeed, Berk and Stanton (2004) highlight the potential importance of fund governance in explaining discounts.

Second, the replacement of a manager is a unique opportunity to study the determinants and implications of fund discounts, in particular, the relation between discounts and managerial ability. 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 role for fund performance in explaining discounts. However, these studies do not endogenize manager replacement when examining NAV performance. Our tests depart from this prior literature by jointly considering portfolio performance, discount dynamics, and manager replacement in an empirical setting. This framework allows us to address several interesting issues. For example, do changes in the discount convey additional information about managerial ability, above that conveyed by the NAV performance of a fund manager? This could be the case if, for example, investors and the fund's board of directors look at other indicators of manager quality beyond the current performance record of the manager–such as news reports about the manager or the performance of the manager with another fund. Another issue is whether fund shareholders rationally endogenize the evolving performance of the fund manager, and its implications for manager replacement, when they set the share price and, thus, the discount or premium from NAV. If they do, we may find that the anticipation of manager

replacement may have important influences on the relation between NAV performance and fund discounts.

Our results are as follows. First, our findings do not provide support for a labor-market where good managers are leaving whereas poor managers are entrenched, as assume by Berk and Stanton (2004). In contrast, our results are similar to those found in the open-end fund industry. More specifically, we find that replaced managers underperform their peer groups in the two-year event window prior to replacement, and that fund performance (relative to peer group) improves after replacement. Second, we document an interesting relation between the discount return (the return to closed-end fund investors that is due to changes in the discount) and manager turnover, especially for U.S. domestic equity closed-end funds. Specifically, we find that the discount return, lagged two years, helps to predict manager replacement, but one-year lagged discount return does not. This finding indicates not only that the change of discount provides additional information about managerial ability, but also that the expectation of manager replacement is at least partially reflected in the discount during the period immediately preceding replacement. Further, in the U.S. domestic fund sample, we find that investor anticipation of manager replacement changes the relation between discount return and NAV performance. When the probability of manager replacement is remote, there is a positive relation between discount return and NAV return; however, such a relation disappears in the period immediately before replacement (due to the near certainty of replacement interpreted by investors). Overall, our results contradict the explanation of closed-end fund discounts offered by Berk and Stanton (2004); however, our results indicate that fund discounts do reflect investors' expectations regarding both the fund manager's ability and the fund management company's future actions.

A paper that is related to ours is Rowe and Davidson III (2000), which is, to the best of our knowledge, the only previous study on manager turnover in closed-end funds. The authors investigate the abnormal return of closed-end fund shares around 102 announcements of management successions. They find that overall abnormal returns around these

announcements are insignificant, but that returns surrounding announcements are positive for funds with larger expense ratios, higher discounts, and a higher percentage of inside director stock ownership. They also find that the NAV performance increases and the expense ratio decreases subsequent to manager replacement. Our paper substantially adds to these findings by investigating the role of NAV performance *and* discount return in predicting manager replacement. As such, we develop a richer model of the dynamic nature of closed-end fund discounts.

In addition, two other related papers examine the internal governance of closed-end funds. 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. Coles, Suay, and Woodbury (2000) find that fund discounts are lower when the compensation of the fund advisor is more sensitive to fund performance.

The rest of this paper is structured as follows. Section 2 develops the main hypotheses that we test. Section 3 describes our dataset. Section 4 presents our main empirical results on the dynamic relations between NAV performance, discount changes, and manager replacement events. Section 5 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 stock 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 simply the sum of returns in each individual period. Formally, the period-t returns are calculated as follows,

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

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

where P_t is the stock price of the closed-fund at the end of period t, and NAV_t is its net asset value per share at the end of period t after expenses and dividends, DIV_t is the cash distribution between the end of period $t-1$ and t, f_t is the per-period expense ratio. Our definition of NAV-return captures the total return generated by the fund's portfolio, including the 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:

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

This definition recognizes the fact that at the ex-dividend day, *ceteris paribus*, the fund's stock price and NAV should drop by the same amount, i.e., DIV_t, but the resulting change in the discount is purely mechanical and has no effect on the return to shareholders.[3]

A combination of the two discounts defined above can be used to measure the return to

[3]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.

closed-end fund investors caused by the change of discount. We call this term "discount return" and define it as follows,

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

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.[4] By definition, we have

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

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 performance and manager turnover

Since the NAV-return is a direct measure of managerial ability, under a well-functioning internal governance mechanism, one would expect that poor NAV-return will lead to a manager replacement, which in turn will be followed by an improvement in NAV-performance. Therefore, we can derive the following testable predictions from the effective governance hypothesis:

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. More extremely, if good managers leave and

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

bad managers are entrenched, as Berk and Stanton (2004) assume, we would observe a positive relation between lagged NAV-return and manager replacement and a deterioration of NAV-performance after manager replacement.

2.3 Fund discounts and manager turnover

Deriving hypotheses for the relation between discounts and manager replacement is less straightforward. First, as Lee, Shleifer, and Thaler (1991) argue, discounts may be largely driven by investor sentiment. Second, poor portfolio performance may lead investors to anticipate a manager replacement and thus, may not imply a larger discount. Based on these arguments we can derive several hypotheses.

First, if discounts are purely driven by investor sentiment and convey no information about managerial ability, the discount return will not predict manager replacement. In fact, in this case a well-functioning internal governance system should try to eliminate influence of discount change on the fund's stock return when evaluating the manager's performance. Therefore the NAV return (accounting measure) will be a better measure of performance than the stock return (market measure).

Hypothesis III (investor sentiment): *Discount returns do not predict manager replacement.*

Second, suppose that investors are rational when pricing the fund's shares and that they learn about managerial ability only via the observed NAV-return. Then past discount returns when considered in isolation may predict future management replacement. However, they do not have additional explanatory power once past NAV-returns are considered.

Hypothesis IV (NAV single signal): *Past discount returns are negatively related to future manager replacement, but this negative relation becomes insignificant after controlling for past NAV-returns.*

Third, suppose that investors use not only NAV-returns to derive their posterior beliefs about managerial skills. Instead they also observe other signals, such as the concepts un-

derlying the manager's portfolio strategies, the performance of other funds managed by the same manager etc.. Suppose initially that investors do not anticipate manager replacement. Then the relationship between the additional signals and the pricing of the fund's shares by investors is straightforward. Bad signals about managerial skills lead to lower share valuations and thus to larger discounts. Then, if internal governance mechanisms are efficient in the sense that poor quality managers are replaced, past discount returns are negatively related to future management replacement, even when they are jointly used with past NAV-returns as explanatory variables.

Hypothesis V (multiple signals, no anticipation): *Past discount returns are negatively related to future manager replacement, even when used jointly with past NAV-returns as explanatory variables.*

Fourth, suppose that investors also rationally anticipate manager replacement. In this case we would expect a non-linear relation between the investors' posterior beliefs about the portfolio manager's skills and the discount at which they price the shares. When the market receives a first poor signal, it revises upwards its posterior belief that the quality of the manager is poor. At the same time the market recognizes that the management company does not yet have enough information to justify a manager replacement. The share price therefore falls relative to NAV.

Once additional unfavourable information is obtained in the form of low NAV-returns, the posterior probability that the manager has poor skills rises and so does the probability that the manager will be replaced. The discount could therefore decrease in response to a poor NAV-return. Therefore, although the discount return in earlier periods should predict management replacement, the discount return in the period immediately prior to replacement has an ambiguous relation with the probability of future replacement.

Hypothesis VI (multiple signals with anticipation): *Discount returns in earlier periods before replacement are negatively related to the probability of manager replacement, but discount returns in the period immediately prior to replacement can have a positive, negative or no relation with the probability of manager replacement.*

Finally, our arguments also imply that in a rational world, the relation between discount return and NAV return will be influenced by the anticipation of manager replacement. When the possibility of manager replacement is remote, there should be a positive relation between NAV-return and discount return, because high NAV-return signals high managerial ability (learning effect). However this relation become ambiguous if the anticipation of manager replacement (anticipation effect) becomes stronger. It can even be reversed as the anticipation effect dominates the learning effect. This leads to the following testable hypothesis.

Hypothesis VII: *Discount returns in earlier periods before replacement are positively related to NAV returns, but discount returns in the period immediately prior to replacement can have a positive, negative or no relation with NAV returns.*

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 obtained the investment objective, weekly price and net asset value, monthly size, annual expenses, and daily information on distributions from Lipper, a leading provider of mutual fund and closed-end fund data. The weekly stock return, NAV-return and discount return are then calculated according to definitions (1), (2) and (5). The annual expense ratio is divided by 52 before it is used to calculate the NAV-return. Second, fund manager information is obtained from Morningstar. This data includes 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. The Lipper data starts from the beginning of 1985 and ends at the end of 2002. The Morningstar manager data ends on July 31, 2004. Manager data for years earlier than 1985 is also provided by Morningstar but is known to be less reliable. Both the Lipper

and the Morningstar databases cover dead funds as well as active funds, therefore, the survivorship bias is not a concern for our study. The Morningstar data covers also the U.S. open-end funds, which allows us to examine to what extent the closed-end fund managers are involved in the management of open-end funds.

We adopt the following sample selection procedure. We start with all fund in the Lipper database. First, we exclude funds without dividend, total net assets, and expense ratio data; Second, we exclude funds that have less than 104 observations of weekly NAV or discount returns; Third, we exclude all convertible, warranty, preferred stocks, and international debt funds since the number of such funds are small. We are left with 501 Lipper funds after these three steps. We then exclude all those 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. Among them 88 ceased to exist before the end of 2002. The 55 unmatched funds do not display any systematic difference from those remaining in our final sample.

According to the Lipper fund 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 fund's investment objectives.[5] Table 1 displays the distribution of our sample funds across categories as well as across investment objectives. Our sample exhibits a pronounced feature of the US closed-end fund market: the market are dominated by bond funds, especially the municipal bond funds. Almost one half (213) of our sample funds are municipal bond funds. The domestic equity (47) and international equity funds (63) together constitute only about one quarter of the sample. This is in sharp contrast to the UK market, where all closed-end funds are equity funds. The number of funds also differs substantially across the investment objectives, ranging from 2 funds in the Global Fund group to 46 funds in the General Mini Debt Fund (Leveraged) group.

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

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. The funds are further classified into four categories according to investment objectives. The 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 for 5 sample years**

This table presents yearly statistics by fund category for our matched sample in five sample years. For each year, only funds with no less than 26 weekly return observations are included. Except for the number of funds, all the statistics are median values calculated from all funds within the same category. Each fund's yearly returns are calculated by multiplying the average weekly returns by 52. Total net assets and discount are the simple averages of monthly and weekly observations respectively.

		1985	1990	1995	2000	2002
Number of funds	Domestic Equity	5	29	38	42	40
	Taxable Bond	20	69	114	100	89
	Municipal Bond	0	43	197	194	183
	International Equity	0	30	61	55	50
Total net assets ($ million)	Domestic Equity	55.20	74.98	91.88	137.23	142.23
	Taxable Bond	85.64	118.63	167.76	167.34	145.43
	Municipal Bond		191.25	140.82	157.81	173.05
	International Equity		100.18	122.81	134.77	91.77
Discount (%)	Domestic Equity	3.49	13.52	11.26	14.20	8.21
	Taxable Bond	-0.22	3.32	6.59	9.28	0.97
	Municipal Bond		-1.68	8.09	8.65	3.75
	International Equity		2.36	9.23	24.13	14.32
Expense (%)	Domestic Equity	1.06	1.23	1.22	1.44	1.57
	Taxable Bond	0.84	1.03	0.97	1.01	1.06
	Municipal Bond		0.89	1.05	1.09	1.07
	International Equity		1.81	1.77	1.90	1.96
NAV return (%)	Domestic Equity	26.48	-1.17	24.52	6.27	-21.44
	Taxable Bond	24.48	5.24	19.67	6.43	5.34
	Municipal Bond		7.00	21.52	14.96	11.88
	International Equity		-10.14	3.21	-25.02	-3.20
Discount return (%)	Domestic Equity	-0.80	-0.96	0.73	0.97	-0.32
	Taxable Bond	-1.09	-3.06	0.53	11.17	-0.67
	Municipal Bond		-2.32	0.18	2.45	-1.02
	International Equity		-31.45	-0.16	0.91	2.08
Stock return (%)	Domestic Equity	24.78	-7.58	21.18	7.90	-24.76
	Taxable Bond	24.02	1.41	19.00	13.03	4.18
	Municipal Bond		3.97	21.50	15.86	9.46
	International Equity		-52.74	1.02	-25.79	-0.64

3.2 Fund characteristics

Table 2 summarizes fund statistics for 5 sample years, 1985, 1990, 1995, 2000, and 2002. For each sample year, we report the total number of funds, the median size (measured by total net assets), discount, expense ratio, NAV return, discount return, and stock return for each fund category. Only funds with no less than 26 weekly return observations are taken into account. The annual returns are calculated by multiplying each year's average weekly returns by 52. The discount and total net assets are simple averages of weekly and monthly observations respectively. Some notable features emerge from the table. First, the equity funds tend to have a smaller size and a higher expense ratio than the bond funds. The expense ratio of international equity funds is persistently higher than all other types of funds. Second, the NAV-returns of equity funds exhibit higher volatility than the NAV-returns of bond funds. Third, the discounts of equity funds are generally higher than the discounts of bonds funds, and the discounts of international equity funds exhibit the highest volatility, generating a median discount return of -31.45 percent in 1990 and 2.08 percent in 2002. Fourth, even for the bond funds, discount changes seem to have an important effect on the return on the fund's stock. For example, the median discount return of the taxable bond funds was -3.06 percent in 1990 and 11.17 percent in 2000.

3.3 Manager characteristics

Table 3 summarizes the manager characteristics for our sample funds in 5 sample years (at the year end). Panel A reports the average manager tenure, measured in years, across funds in each category. For a team-managed fund, the manager tenure is calculated as the average tenure of all active managers at that time. It seems that the managers of domestic equity funds have a substantially longer tenure than managers in other fund categories. Since 1990, there is also a tendency toward longer tenure in all fund categories. Panel B reports the average size of the management team, i.e., the average number of managers who were involved in the management of a specific fund. It shows that taxable bond funds tend to have a larger management team than other funds. It also exhibits a tendency

toward a larger management team 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 that a manager is involved in the management of several funds at the same time. Panel C of Table 3 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 other managers. It is calculated as follows: For each reporting time, we first identify all the managers who were managing at least one of the closed-end funds in our final sample, we then search through the Morningstar fund manager database, which covers both closed-end funds and open-end funds, to determine the total number of funds each manager was managing at that time. The resulting numbers are then averaged across managers within each fund category to get the category mean. The table shows that managers of bond funds, especially the municipal bond funds, tend to manage a larger number of funds simultaneously. This may have something to do with the relatively lower risk of bond funds. We also find that although it is common that a manager is managing both closed-end funds and open-end funds at the same time, very few managers manage funds of different categories simultaneously.

3.4 Manager replacement sample

We now present summary statistics for manager replacement. We define the manager replacement as an event that at least half of the fund managers are replaced by one or more new managers. The new manager(s) should join the fund within 12 weeks before or after the replaced manager(s) leaves. The event week is defined as the week when the old managers depart. In most of the cases, this is also the week when the new manager(s) comes in. For a manager replacement to be included in our event sample, we impose several additional conditions: first, at least one of the replaced manager should have a tenure longer than two years (i.e.,104 weeks); in addition, fund data, including at least 40 weekly return observations each year, must be available for the 2-year period prior to the replacement.

Table 3: **Manager characteristics in 5 sample years**

This table summarizes the manager characteristics for our sample funds in 5 sample years (at the year end). Panel A reports the average manager tenure, measured in years, across funds in each category. For a team-managed fund, the manager tenure is calculated as the average tenure of all active managers at that 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
Panel A: The average manager tenure					
Domestic Equity	10.84	6.08	6.65	8.89	10.43
Taxable Bond	5.96	3.16	4.33	7.46	8.24
Municipal Bond		1.75	3.10	6.15	6.88
International Equity	1.98	2.30	3.64	6.09	7.81
Panel B: The average management team size					
Domestic Equity	1.08	1.35	1.61	1.63	1.64
Taxable Bond	1.59	1.54	1.92	2.10	2.26
Municipal Bond		1.21	1.21	1.22	1.43
International Equity	1	1.19	1.48	1.49	1.35
Panel C: The average number of funds managed by a manager					
Domestic Equity	1.17	1.69	2.78	2.63	2.75
Taxable Bond	1.48	2.51	4.17	3.59	3.11
Municipal Bond		4.94	8.44	7.38	7.65
International Equity	1.25	1.42	2.13	2.41	1.70

These conditions are imposed since we need to build a pre-replacement record for the replaced manager(s). We consider only the manager replacements happening in the period 1985 to 2002. To avoid some funds/periods being over-represented, we also exclude the replacements that took place within one year since the last replacement event. Based on these criteria, we identify a total of 260 manager replacement events in our sample. These events occurred in 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 clearly excludes the case where a manager loses his job due to the termination of the fund he used to manage. Although the termination of underperforming funds represents another important mechanism to discipline fund man-

Table 4: **The distribution of manager replacement and control observations**
Panel A presents the distribution of manager replacement events cross time and fund categories. A manager replacement is defined as an event that at least half of the fund managers are replaced by one or more new managers. Some additional criteria have been imposed for a manager replacement to be included in our sample. Panel B reports the distribution of the control sample, which is constructed as follows: For each fund that experiences a manager replacement at 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 sufficient financial data or having been selected as a control fund for a replacement happening within one year before are excluded.

	1985-1999	1990-1994	1995-1999	2000-2002
Panel A: The distribution of manager replacement events				
Domestic Equity	2	5	8	6
Taxable Bond	4	22	37	8
Municipal Bond	0	24	73	13
International Equity	1	11	40	6
Panel B: The distribution of control funds				
Domestic Equity	6	22	16	36
Taxable Bond	15	50	87	38
Municipal Bond	0	37	299	126
International Equity	1	20	58	25

agers, 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 managerial performance, to contaminate the pre-replacement discount dynamics. In our manager replacement sample, only 11 out of the 196 funds were terminated within 2 years after replacement. Their effect on discount movement is negligible.

4 Empirical Analysis

4.1 Performance Surrounding Manager Replacement

We first analyze the characteristics of closed-end funds experiencing a manager replacement by presenting various performance statistics during the weeks surrounding the re-

placement event. Under the effective governance hypothesis, we should observe underperformance in NAV returns before a replacement event (Hypothesis I), followed by improved NAV returns afterwards (Hypothesis II). An opposite pattern will be observed if the assumption of Berk and Stanton (2004) is true, i.e., if good managers leave and bad managers are entrenched.

We choose an event window of four years, i.e., 104 weeks before and 104 weeks after the replacement of a manager. We measure abnormal returns for the event-fund as the difference in returns between the event-fund and the equal-weighted fund category to which the fund belongs. For example, the category-adjusted NAV-return for fund i during week t is

$$AR_{i,t}^{NAV} = R_{i,t}^{NAV} - \overline{R_t^{NAV}} \tag{6}$$

where $R_{i,t}^{NAV}$, defined by Equation (2), is the NAV-return for fund i during event week t, and $\overline{R_t^{NAV}}$ is the equal-weighted NAV-return of all funds in the same category as fund i during week t. The cross-sectional average category-adjusted NAV-return during week t is calculated as

$$AR_t^{NAV} = \frac{1}{N}\sum_{i=1}^{N} AR_{i,t}^{NAV}, \tag{7}$$

where N equals the number of funds that experience a manager replacement event, and t is the week relative to the replacement event. Finally, the cumulative category-adjusted NAV-return over K event weeks is simply the sum of AR_t^{NAV},

$$CAR_{\tau,\tau+K}^{NAV} = \sum_{t=\tau}^{\tau+K} AR_t^{NAV}. \tag{8}$$

The cumulative category-adjusted discount return and stock return, $CAR_{\tau,\tau+K}^{D}$ and $CAR_{\tau,\tau+K}^{S}$, are calculated similarly.

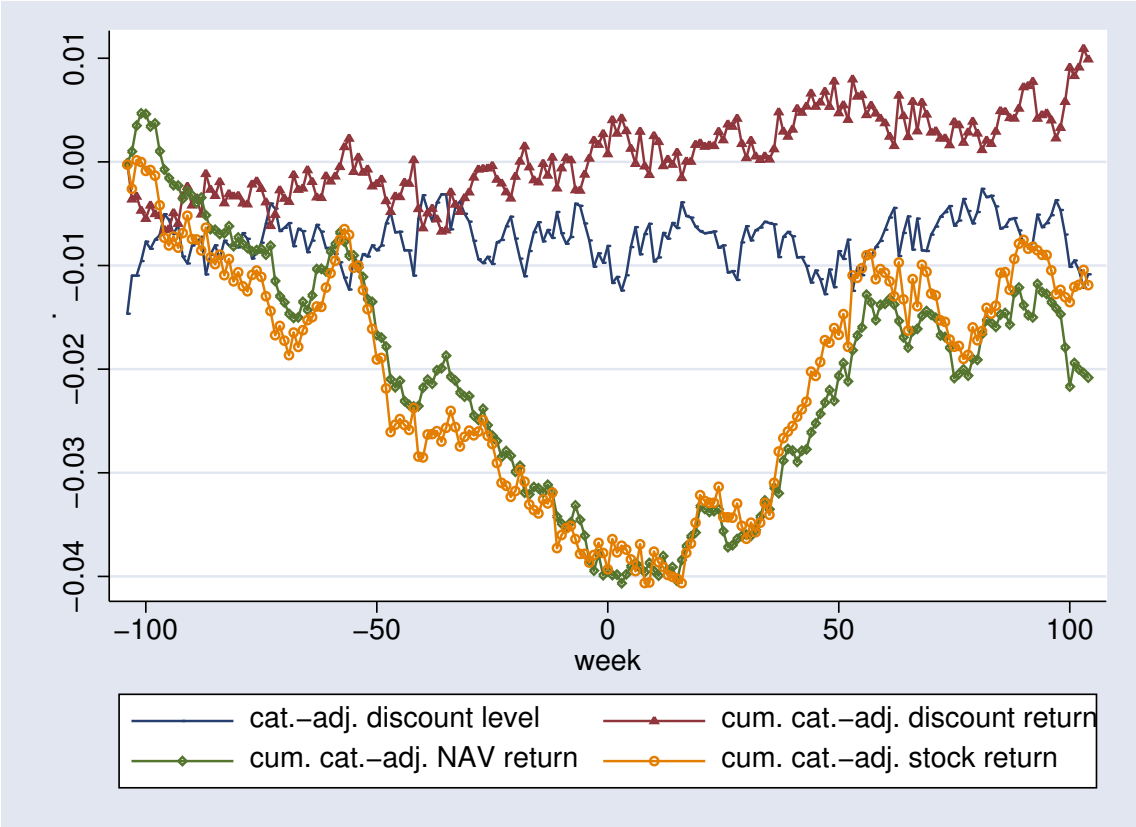
Figure 1 plots the average category-adjusted discount level, as well as the cumulative

category-adjusted NAV return, discount return and stock return over the four-year event window for the 260 closed-end funds that experienced a manager replacement event. The most dramatic finding is a steadily increasing gap between the cumulative NAV-returns of event funds and the category average for these funds. Specifically, at the time of the manager replacement, the cumulative category-adjusted NAV return is about minus four percent. Given that more than two-thirds of the replacement events occur in bond funds, an average underperformance of two percent per annum is quite large. Note, also, that the deterioration of NAV-performance stops after the replacement event, followed by an improvement a few weeks later. The relatively good performance of the new managers lasts about one year; afterwards, their cumulative NAV-returns fluctuate around -1.5 percent, relative to the category average. The cumulative stock return behaves in a very similar way. These striking patterns strongly support the presence of effective governance in closed-end funds (Hypothesis I and II). While the replacement event does not completely reverse the low NAV return of such funds, a great proportion of the underperformance is eliminated.

The patterns of the discount level and discount return are much less clear. The discount level of the event funds is slightly lower than the category average throughout the event window, while the cumulative discount return of event funds is marginally below the category average before replacement, and marginally above the category average after replacement.

To test whether the differences between event funds and category averages 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). We calculate the NAV-return, discount return, and stock return during each subperiod, as well as average discount levels and expense ratios across all weeks of the subperiod, for

Figure 1: **The category-adjusted performance surrounding manager replacement**



This figure plots 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 replacement events.

each event fund, and compare them with the equal-weighted category means during the same period. For example, the NAV-return of event fund *i* during year -2 is calculated as

$$R^{NAV}_{i,y(-2)} = \frac{52}{L_i} \sum_{t=-104}^{-53} R^{NAV}_{i,t}, \tag{9}$$

where $R^{NAV}_{i,t}$ is set equal to zero if the NAV-return in week t is missing, and L_i is the total number of non-missing fund i NAV-returns during year -2. The category-adjusted NAV-return of fund i during year -2 is calculated as

$$AR^{NAV}_{i,y(-2)} = R^{NAV}_{i,y(-2)} - \overline{R^{NAV}_{i,y(-2)}}, \tag{10}$$

where $\overline{R^{NAV}_{i,y(-2)}}$ is the equal-weighted category NAV return in year -2, calculated across all funds in the category having at least 40 weekly NAV-return observations during year -2.

For each subperiod, 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 these measures, averaged only across event funds in a given fund investment-objective category. The last two columns report cross-sectional averages of differences between pre- and post-replacement category-adjusted statistics, using a two-year and four-year event window, respectively. The statistical significance of those differences are indicated as well.

The table shows that event funds, on average, have expense ratios and discounts that are, in general, not significantly different from the average category fund across all subperiods. Further, the category-adjusted NAV-, discount-, and stock-returns are insignificant during year -2 but the category-adjusted NAV-return and stock-return are significantly negative during year -1. Specifically, event funds underperform their category averages by 2.85 percent (in NAV returns) and by 2.69 percent (in stock returns). However, the NAV-return and stock return, adjusted by category averages, reverses during the years following manager replacement. During year +1, new managers significantly outperform category averages in NAV-returns by 1.94 percent, and in stock returns by 2.01 percent. Interestingly, this outperformance seems to be a short-run effect: during year +2, the category-adjusted NAV- and stock return are no longer significant. In accordance with these results, column 5 of table 5 shows that the year +1 category-adjusted NAV return is 5.00 percent higher than its year -1 value, while the difference between pre- and post-stock returns is 4.72 percent (similar results are indicated by differencing the two years before and after replacement).

This dramatic turnaround in fund performance following manager replacement cannot be attributed to the non-survival of underperforming funds, because as we have noted, among the 196 funds in our manager replacement sample, only 11 funds did not survive for two full years after manager replacement. And, until their disappearance, the perfor-

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 the standard t-statistics, in the four sub-periods surrounding the 260 replacement events in our sample. Panel B to E report the results on NAV- and discount returns for each fund category. The last two columns of the table report the cross-sectional averages of differences between the post- and pre-replacement category-adjusted statistics, using a 2- year and 4-year event window respectively. The statistical significance of those differences, based on the standard t-statistics, are indicated by the stars beside the numbers. All numbers, except for year and number of observations, are percentages.

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	0.45
NAVreturn	-1.02	-2.85***	1.94**	0.01	5.00***	5.30***
Discount return	-0.34	0.19	0.09	0.49	-0.30	1.59*
Stock return	-1.38	-2.69***	2.01**	0.47	4.72***	6.91***
Panel B. Average category-adjusted statistics: Domestic Equity						
No. of Obs.	21	21	19	18	19	18
NAVreturn	-8.16	-3.29*	2.63	2.27	4.74*	11.47**
Discount return	-2.54	1.35	1.49	2.53*	0.18	5.83*
Panel C. Average category-adjusted statistics: Taxable Bond						
No. of Obs.	71	71	65	58	65	58
NAVreturn	-1.07	0.49	-0.30	-0.09	-0.63	0.44
Discount return	-0.66	0.01	-0.88	0.35	-1.08	1.46*
Panel D. Average category-adjusted statistics: Municipal Bond						
No. of Obs.	110	110	98	92	98	92
NAVreturn	-0.50*	-0.69*	0.51**	0.24	1.31***	1.80***
Discount return	-0.36	-0.03	0.66	0.18	0.30	1.70**
Panel E. Average category-adjusted statistics: International Equity						
No. of Obs.	58	58	56	54	56	54
NAVreturn	0.63	-10.89***	6.81**	-1.05	18.09***	14.4**
Discount return	0.89	0.40	-.25	0.49	-0.65	0.10

* significant at 10% level; **significant at 5% level; *** significant at 1% level.

mance of these nonsurvivors is not significantly different from other event funds in the same category.

Qualitatively similar patterns are present in the disaggregated data (Panels B through E): except for taxable bond funds, NAV returns improve significantly after manager re-

placement, especially for international equity funds.[6] Category-adjusted discount returns, while insignificant, exhibits an interesting pattern: during year -2, all domestic investment categories exhibit negative discount returns, which become generally positive during year -1. Although these findings are suggestive of a role for discounts in predicting manager replacement, such evidence is weak, possibly due to the low power of such simple univariate averages.

Overall, our simple event statistics presented so far indicate a strong role for NAV returns in predicting manager replacement, consistent with the view that governance of closed-end funds is effective. In the next section, we undertake more comprehensive multivariate tests that further explore our hypotheses.

4.2 Predicting Manager Replacement

We now examine the determinants of manager replacement 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 of a team member or the addition of a manager to an existing team, over weeks $t-104$ to $t+104$.[7] 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. To avoid some funds/periods being over-represented in the control sample, we exclude, from a control sample, those funds that have been selected as a control fund for another replacement happening during the prior year. This procedure enables us to construct a control sample of 836 observations, although, for some events, no control

[6] However, international equity funds have widely diverging strategies, 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.

[7] For the manager replacements happening in late 2002, we only require that the control funds did not have any manager change until July 31, 2004, the last date in our manager data set.

funds are available. The distribution of control observations across fund categories and time periods are displayed in the Panel B of Table 4.

We are mainly interested in how past performance, measured by category-adjusted NAV-, discount- and stock-returns, are related to the probability of manager replacement. Since the cross-sectional volatility of returns varies from one fund category to another, we would expect that the influence of a given percentage point of underperformance on the probability of manager replacement would also vary across categories. For example, a fund that underperforms its peers by one percent in the highly volatile International Equity sector would give much less information about managerial ability than a similar fund in the relatively stable Municipal Bond category. To address this problem, we standardize all the category-adjusted returns by dividing them by the cross-sectional standard deviations. For example, the standardized category-adjusted NAV-return in year -2 is calculated as follows:

$$SAR^{NAV}_{i,y(-2)} = \frac{AR^{NAV}_{i,y(-2)}}{\sigma^{NAV}_{y(-2)}}, \tag{11}$$

where $AR^{NAV}_{i,y(-2)}$ is the category-adjusted NAV-return of fund i in year -2, as defined by Equation (10); $\sigma^{NAV}_{y(-2)}$ is the cross-sectional standard deviation of NAV-return in year -2, calculated using all funds belonging to the same fund category and having no less than 40 weekly return observations in year -2. The standardized category-adjusted discount return and stock returns are computed in the same way.

We consider also several control variables, which include standardized category-adjusted discount level, fund size, expense ratio, and three category dummies. All the explanatory variables that are used in at least one of our model specifications are listed below:

- Three category dummy variables, which are included to capture the unconditional difference in the probability of manager replacement across the four fund categories.

- $SAR^{S}_{y(-1)}, SAR^{S}_{y(-2)}$: The standardized category-adjusted stock returns in year -2 and -1 respectively;

- $SAR^{NAV}_{y(-1)}, SAR^{NAV}_{y(-2)}$: The standardized category-adjusted NAV returns in year -2 and -1 respectively;

- $SAR^{D}_{y(-1)}, SAR^{D}_{y(-2)}$: The standardized category-adjusted discount returns in year -2 and year -1 respectively;

- *SADis*: The standardized category-adjusted discount levels in year -1;

- *SASize*: The standardized category-adjusted fund size, measured by the logarithm of the average total net asset in year -1;

- $SAExp$: The standardized category-adjusted expense ratio in year -1.

Table 6 displays the results for several specifications of the logit regressions, using the aggregate data. Model 1 tests the predictive power of the lagged stock return, which is a linear combination of NAV-return, discount return and expense ratio. Models 2 and 3 test the predictive power of the two most important components of the stock return, i.e., 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 not jointly significant. The pseudo R^2 is a frequently used goodness-of-fit measure for the logit model. It is defined as

$$pseudoR^2 = 1 - \frac{\ln L}{\ln L_0}, \tag{12}$$

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

This table presents the estimated logit regression results for the full sample. 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. Absolute values of z-statistics are in parentheses. Likelihood ratio statistic tests the null hypothesis that all explanatory variables are not jointly significant.

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)**
$SAR^{S}_{y(-1)}$	-0.201				
	(2.73)***				
$SAR^{S}_{y(-2)}$	-0.137				
	(1.93)*				
$SAR^{NAV}_{y(-1)}$		-0.203		-0.212	-0.223
		(2.60)***		(2.68)***	(2.77)***
$SAR^{NAV}_{y(-2)}$		0.099		-0.087	-0.091
		(1.34)		(1.14)	(1.19)
$SAR^{D}_{y(-1)}$			-0.071	-0.070	-0.069
			(0.96)	(0.92)	(0.90)
$SAR^{D}_{y(-2)}$			-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 χ^2	32.79***	31.93***	25.11***	35.20***	44.35***
$PseudoR^2$	0.027	0.027	0.020	0.029	0.037

* significant at 10% level; ** significant at 5% level; *** significant at 1% level.

where $\ln L_0$ is the log-likelihood computed with only a constant term as the explanatory variable, $\ln L$ is the log-likelihood obtained from the model of interest.

The logit regressions not only confirm many prior results reported in Table 5, but also

yield some interesting new findings. The hypothesis that all explanatory variables are jointly insignificant is rejected for all models, although the pseudo R^2 is low.[8] Model 1 shows that the (standardized category-adjusted) stock returns in 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.[9] Further, model 2 shows that the NAV-return predicts manager replacement only during year -1, while model 3 shows that discount return predicts manager replacement only in year -2. This result remains unchanged when past NAV-returns and discount returns enter into the regressions jointly (model 4), or when more control variables are included (model 5). Both the magnitude and the statistical significance of the estimated coefficients are robust to the change of model specification.

The inverse relation between past NAV-return and manager replacement is consistent with our Hypothesis I. It is also consistent with previous findings on the turnover of open-end fund managers.[10] It indicates that job market disciplining is effective not only for open-end fund managers, but also for closed-end fund managers. In addition, this result contradicts the manager entrenchment assumption of Berk and Stanton (2004).

The fact that the discount return in year -2 has incremental predictive power for manager replacement indicates that the dynamics of the discount convey additional information about managerial ability, while the lack of a significant relation between discount return in year -1 and manager replacement is consistent with the conjecture that manager replacement is at least partly anticipated during year -1. Therefore our logit regression results lend support to Hypothesis VI (multiple signals with anticipation) outlined in Section 2.2. They do not support the hypothesis that the change of discount is purely driven

[8]The poor fit is not very surprising, given that manager replacement happens for a variety of reasons–for example, a manager may leave for exogenous reasons, such as retirement or a move to a new fund. Our data does not allow us to control for such non-performance reasons.

[9]Note that the coefficient of an independent variable X_i in the logit model measures the percentage change of the odds ratio, i.e., the probability of an event versus the probability of a non-event, caused by per unit change in X_i.

[10]See for example, Khorana (1996), Chevalier and Ellison (1999a), Hu, Hall, and Harvey (2000), Ding and Wermers (2004).

by investor sentiment. Investors gather information from other sources during year -2, resulting in an increase in the discount for funds with a higher probability of manager replacement. During year -1, the poor NAV return gives further information about managerial ability and investors become surer that the poor manager will be replaced, therefore the discount does not increase further in year -1.

Model 5 also shows the relation between the probability of manager replacement and discount level, expense ratio and fund size. The negative relation between discount level and manager replacement is somewhat surprising, but might be understood in the following way. First, our previous results have indicated that manager replacement is at least partially anticipated and reflected in discounts, therefore the discount level prior to manager replacement is not necessarily higher than average. Second, 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. The lower discounts of the event funds may be due to such non-performance factors. By contrast, the discount return will not be influenced by those fund-specific factors as long as they do not change over time, therefore it will reflect a change in investor beliefs about managerial ability more accurately.

The positive relation between expense ratio and probability of manager replacement is easy to interpret. First, for a given NAV-return, a higher expense ratio implies a lower net return to investors, therefore the management company and the fund's board of directors will face higher pressure from the investors to replace the manager. Second, an important component of the expenses is the management fee paid to the management company. When the management fee ratio is higher, the management company will have stronger incentives to fire an underperforming manager, this will result in higher manager turnover rate in high fee funds. Previous research has found that larger firms tend to have a higher frequency of manager replacement(see Hu, Hall, and Harvey (2000) for the case of open-end funds and Warner, Watts, and Wruck (1988) for the case of industrial firms). In our case, although the standardized category-adjusted fund size also has a positive coefficient, the size effect is not statistically significant.

We further divide our sample into domestic funds and international funds, and rerun the logit regressions. Table 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. The main difference is that many of the estimated coefficients become more significant. For example, the coefficient of $SAR^{D}_{y(-2)}$, the standardized category-adjusted discount return in year -2, is now significant at the five-percent level in models 3 and 4, and significant at the one-percent level in model 5. However, our logit models seem to have little success in predicting manager replacement in international equity funds. The null hypothesis that all explanatory variables are not jointly significant cannot be rejected at the five-percent level for all five model specifications we consider. The lack of predicability of manager replacement in international funds may be due to several reasons: First, the sample may be too small to show any statistical significance. Second, the returns of international funds are too volatile, therefore a two-year performance record does not contain enough information about managerial ability, thus possessing little predictive power for manager turnover. Third, as mentioned previously, funds within this category are very heterogeneous. They have widely diverging strategies and systematic risk loadings and require highly market-specific human capital. As Parrino (1997) has found, poor managers are more difficult to identify and more costly to replace in heterogenous industries than in homogeneous industries.

4.3 The relation between NAV return and discount return

Our previous results suggest that the anticipation of manager replacement may indeed be reflected in the fund discount, at least for the domestic funds. This implies that manager replacement is an important factor that needs to be controlled for when examining the relation between NAV return and discount return. We consider a simple test of this idea by examining this relation separately for year -2 and year -1. In year -2, the probability of manager replacement is still remote, therefore the relation between discount return and NAV return should be positive, if investors are trying to infer the fund manager's ability

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. Absolute values of z-statistics are in parentheses. Likelihood ratio statistic tests the null hypothesis that all explanatory variables are not jointly significant.

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)
$SAR^{S}_{y(-1)}$	-0.183				
	(2.24)**				
$SAR^{S}_{y(-2)}$	-0.235				
	(2.95)***				
$SAR^{NAV}_{y(-1)}$		-0.191		-0.200	-0.237
		(2.17)**		(2.25)**	(2.59)***
$SAR^{NAV}_{y(-2)}$		-0.154		-0.124	-0.151
		(1.87)*		(1.45)	(1.76)
$SAR^{D}_{y(-1)}$			-0.110	-0.081	-0.074
			(1.33)	(0.96)	(0.86)
$SAR^{D}_{y(-2)}$			-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 χ^2	21.25***	18.06***	13.09**	22.98***	38.63***
$PseudoR^2$	0.022	0.019	0.013	0.024	0.040

* significant at 10% level;** significant at 5% level; *** significant at 1% level.

from the realized NAV return. However, in year -1, it may have become much clearer that a manager replacement will occur, therefore the relation may become much more tenuous.

We divide the 260 event funds in our manager replacement sample into domestic funds and international funds, and run a simple univariate regression of standardized

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. Absolute values of z-statistics are in parentheses. Likelihood ratio statistic tests the null hypothesis that all explanatory variables are not jointly significant.

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)***
$SAR^{S}_{y(-1)}$	-0.312				
	(1.82)*				
$SAR^{S}_{y(-2)}$	0.275				
	(1.66)*				
$SAR^{NAV}_{y(-1)}$		-0.220		-0.249	-0.327
		(1.30)		(1.33)	(1.59)
$SAR^{NAV}_{y(-2)}$		0.136		0.236	0.178
		(0.79)		(1.24)	(0.87)
$SAR^{D}_{y(-1)}$			0.074	-0.045	-0.077
			(0.45)	(0.25)	(0.41)
$SAR^{D}_{y(-2)}$			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
$PseudoR^2$	0.025	0.010	0.004	0.017	0.023

* significant at 10% level;** significant at 5% level; *** significant at 1% level.

category-adjusted discount return on standardized category-adjusted NAV-return for both sub-samples. We do this for year -2 and year -1 separately. The results are reported in Table 9.[11]

The results for domestic funds (Panel A) support our Hypothesis VII. There is a significant, positive relation between discount return and NAV return during year -2, and an

[11] Using White (1980)'s heteroskedasticity-corrected estimate of standard deviations does not change the statistical significance of the coefficients.

insignificant relation during year -1. The results for international equity funds are more difficult to explain: the relation between discount return and NAV-return is significantly negative during both periods. Given our previous result that the manager replacement among international funds is difficult to predict, this negative relation cannot be attributed to the anticipation effect. A closer examination of the data reveals that the negative relation exists mainly during the period when a fund's target investment market is undergoing serious financial turmoil. For example, in 1997, when a severe financial crisis broke out in Thailand and rapidly spread to other Asian countries, the standardized category-adjusted NAV return of the Thai Fund was -2.75, while its standardized category-adjusted discount return is 1.95. Jain, Xia, and Wu (2004) provide a liquidity-based explanation for this intriguing phenomenon. They argue that, if the home market, where the fund's underlying assets are traded, and the host market, where fund's stocks are traded, are not fully integrated, fund premia will go up if liquidity dries up in the home market. This was the case during the Asian financial crisis. This result highlights an additional complexity in measuring the performance-discount relation when shares in the fund and shares in fund assets are traded in different markets.

5 Conclusion

Despite the large body of research on closed-end fund discounts, the existing literature provides little information about how the job market of closed-end fund managers works and to what extent fund managers are disciplined by the fund's internal governance system. 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 increase value of their human capital?

At the same time, research on closed-end fund discounts generally ignores the possibility of internal governance actions such as manager replacement. This may be an

Table 9: **The relation between NAV return and discount return**

Panel A presents the estimated OLS regression results for the sample of domestic funds. Panel B presents the estimated OLS regression results for the sample of international equity funds. Absolute values of t-statistics are in parentheses. Using White (1980)'s heteroscedasticity-corrected estimates of standard deviations does not change the statistical significance of coefficients.

	Dependent variable: SAR^D	
	year -2	year -1
Panel A: Domestic funds, N=202		
Intercept	-0.076	-0.033
	(1.14)	(0.44)
SAR^{NAV}	0.160	-0.073
	(2.48)**	(0.88)
R^2	0.030	0.004
Panel B: International Equity funds, N=58		
Intercept	0.075	-0.070
	(0.57)	(0.65)
SAR^{NAV}	-0.366	-0.333
	(2.82)***	(3.03)***
R^2	0.124	0.141

* significant at 10% level;** significant at 5% level; *** significant at 1% level.

important reason why the existing literature generally fails to find a significant role of fund performance in explaining fund discount.

This paper has taken a step toward filling this gap by jointly analyzing portfolio performance, discount dynamics, and manager replacement. Consistent with the presence of an effective internal governance mechanism, we find that replaced managers underperform their peer groups prior to their replacement and that the fund performance relative to peer groups improves after replacement. We also document an interesting relation between discount change and manager turnover, especially for the U.S. domestic funds. While the 2-year lagged discount return is negatively related to the probability of manager replacement, the 1-year lagged discount return has no predictive power. This result indicates not only that the change of discount contains additional information about managerial ability, but also that the expectation of a future manager replacement is at least partially reflected in the discount. For the U.S. domestic fund sample, we also find that the anticipation of

manager turnover changes the relation between discount return and NAV-performance. When the probability of manager replacement is still remote, there is a significantly positive relation between discount return and NAV-return, however, such a relation disappears in the period immediately preceding replacement. Overall, our results cast some doubt on the explanation of closed-end fund discounts via entrenched fund managers, but they support the view that fund discounts are related to investors' rational expectations regarding both fund manager's ability and fund management company's future actions.

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