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Managerial Rents vs. Shareholder Value in Delegated Portfolio Management: The Case of Closed-End Funds

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Abstract

We examine the dynamics of assets under management (AUM) and management fees at the portfolio manager level in the closed-end fund industry. We find that managers capitalize on good past performance and favorable investor perception about future performance, as reflected in fund premiums, through AUM expansions and fee increases. However, the penalties for poor performance or unfavorable investor perception are either insignificant, or substantially mitigated by manager tenure. Long tenure is generally associated with poor performance and high discounts. Our findings suggest substantial managerial power in capturing CEF rents. We also document significant diseconomies of scale at the manager level.

JEL codes: G23, G34

Key Words: Closed-end fund, Closed-end fund discount, Managerial rent

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A prominent feature of the mutual fund industry is the overwhelming popularity of open-end funds (OEFs) over closed-end funds (CEFs). At the end of 2014, the total net assets (TNA) managed by U.S. OEFs and CEFs were $15.9 trillion and $289 billion, respectively.[1] This is puzzling because, from a portfolio management perspective, the closed-end structure has some important advantages over the open-end structure. While short-run fluctuations in fund flows impose significant constraints on the investment strategies of OEF managers, the non-redeemability of CEF shares gives managers much flexibility. It allows them to take illiquid positions, or positions that may underperform in the short run but are desirable from a long-run perspective. Chordia (1996), Nanda, Narayanan, and Warther (2001), and Cherkes, Sagi, and Stanton (2009) explicitly model these advantages of the closed-end structure. Stein (2005) further argues that the degree of open-ending we observe in the industry may be *socially excessive*.

Another long-standing puzzle is the closed-end fund (CEF) discount. Shares issued by CEFs typically trade at a discount (or a negative premium) relative to the underlying portfolio held by CEFs.[2] Intuitively, CEF premiums can be interpreted as a (noisy) measure of the expected value added by the portfolio manager, net of fees, expressed as a percentage of the total net asset value (NAV) of the underlying portfolio. However, with the exceptions of Chay and Trzcinka (1999) and Wermers, Wu, and Zechner (2008), past studies typically do not find a significant relation between CEF discounts and portfolio (NAV) performance.

While these two puzzles are closely related, no studies of which we are aware have addressed them from a common perspective. In this paper, we fill this gap by considering the relative control of fund managers vs. shareholders over the potential rents generated by CEFs. We believe that this relative control not only drives the CEF discount, but also provides a unique perspective from which to analyze the CEF as an organizational form of delegated portfolio management.

We focus on the dynamics of the total assets under management (AUM) and management fees at the portfolio manager level. Specifically, we investigate how manager-specific AUM and

[1] See Investment Company Institute (2015).

[2] See Cherkes (2012) for a recent survey of this literature.

fees are adjusted in response to past performance, as well as to investor perceptions about future performance, as reflected in fund premiums (aggregated to the manager level). By investigating these dynamics, we gain insight into the effectiveness of CEF governance, the market power of CEF managers, and the ability of investors to participate in surplus created in CEFs. These factors ultimately determine the desirability of the closed-end structure from investors' point of view, and whether a CEF should trade at a premium or a discount. We further examine the relative control of CEF managers vs. shareholders by investigating the relation of manager tenure with NAV performance and fund premiums, the time series properties of NAV performance and premiums, and the response of fund premiums to past NAV performance.

It is important to note that the impact of AUM adjustments on the welfare of shareholders depends on the returns to scale in CEF management. If returns to scale are increasing, perhaps because of scale economies in analyzing and trading securities, both shareholders and managers benefit from AUM expansions. However, conflicts of interest arise if an expansion of AUM lowers fund returns, as would be the case if returns to scale are decreasing. As the academic literature remains unsettled on scale economies in asset management, another objective of our paper is to investigate this issue.

As Fama and Jensen (1983) point out, CEF and OEF structures provide very different incentive and discipline mechanisms. The redeemability of OEF shares allows shareholders to withdraw capital on a daily basis from managers with whom they are dissatisfied, which imposes a powerful discipline. At the same time, the daily issuance of shares on demand allows a manager perceived as being skilled to quickly grow his fund. By charging a management fee proportional to the size of AUM, skilled OEF managers can fully capture the value of their skills, while investors break even in expectation, as modeled by Berk and Green (2004).

Such an unfettered market-based governance and compensation mechanism is not available in the CEF industry. Because shares are not redeemable, individual investors cannot force a contraction of AUM controlled by an unskilled manager directly. Instead, investors must resort to a proxy contest, or rely on actions taken by the fund's board of directors, the management company, or activist blockholders. Similarly, managers in high demand are not automatically

rewarded by a growth in AUM, because CEF shares are not issued on demand on a daily basis. While an alternative adjustment may occur through changes in management fees, this adjustment may also involve non-trivial costs. Consequently, investor demand for CEF shares may exceed or fall below the demand for the underlying assets, generating a premium or discount in share prices.

From this perspective, the CEF discount, as well as its relation with fund performance, crucially depends on how AUM and management fees adjust to investor perceptions about managerial skills. If, in the absence of any frictions, AUM and fees are continuously adjusted to an equilibrium level commensurate with perceived managerial abilities, then there will be no premium or discount, and therefore, no relation between NAV performance and fund premiums. If, instead, adjustment costs are high, then NAV performance will be persistent, as it is not immediately reversed by changes in AUM or fees. In addition, if adjustment costs are high, fund NAV performance and fund premiums will be closely related: good NAV performance will lead to a high premium, and a high premium will predict good NAV performance.

To facilitate our empirical tests, we formulate two opposing hypotheses about governance and manager power in the CEF industry. The "Shareholder Surplus Hypothesis" postulates that market frictions, such as the cost of launching a new fund, allow shareholders to extract rents generated by skilled managers, and that effective governance prevents unskilled managers from destroying shareholder value. The "Managerial Rent Hypothesis" postulates that market power allows skilled managers to capture the rents they generate, and that unskilled managers are entrenched due to weak governance.

We combine two comprehensive databases containing information on U.S. CEFs and CEF managers, and construct records of 1,137 managers controlling 679 funds. A key feature of our analysis is that it is performed at the portfolio manager level, while prior studies typically explore data at the fund level. In practice, it is frequently observed that one fund is managed by multiple managers, and that one manager manages multiple funds. In fact, we show that an important way for a well-performing CEF manager to expand his AUM is to start managing an additional fund. Well-performing managers may also move from low-fee funds to high-fee

funds. Fund-level analysis may, therefore, underestimate the reward to good performance. Our focus on a manager-level analysis allows us to better measure the capture of economic rents as well as disciplining mechanisms in the CEF industry. It also allows us to examine potential diseconomies of scale in portfolio management from a unique perspective, i.e., the erosion of fund performance by asset size due to the limited amount of managerial effort, attention, or skills.

Our results provide strong support for the Managerial Rent Hypothesis, especially for bond CEFs. First, we find that managers perceived to be skilled, as proxied by a high fund premium, subsequently capture rents through expansions of AUM and increases in management fees; however, managers that generate a high discount are not penalized accordingly. Second, good NAV performance leads to AUM expansions and management fee increases; poor NAV performance increases the probability of manager departure, but only if manager tenure is not sufficiently long. Third, for managers whose tenure is above average, tenure negatively predicts NAV performance, especially if it is accompanied by a large fund discount; it also negatively predicts fund premiums. Fourth, on average, NAV performance and fund premiums are more persistent when they are below average than when they are above.

We also find interesting relations between NAV performance and fund premiums at the portfolio manager level. Consistent with an expectation of endogenous AUM or fee adjustments in response to extreme past performance (either good or bad), we find that equity fund premiums respond positively only to past NAV performance in the middle range. However, for bond fund managers, premiums also respond strongly to low performance, suggesting that investors expect poor performance to be persistent due to entrenchment of bond fund managers. Furthermore, while premiums do not predict the NAV performance of short-tenure managers, they have statistically stronger predictive power for the NAV performance of long-tenure managers, suggesting that investors are able to form better forecasts of performance for managers with longer track records, and that these longer-tenure managers are less likely to be replaced.

Finally, we find strong evidence of decreasing returns to scale in CEF management. Both NAV performance and premiums are negatively related to the size of a manager's AUM. In

addition, for managers who oversee both CEFs and OEFs, the size of their OEF AUM negatively predicts the CEF performance even after controlling for the size of their CEF AUM. These results suggest that managerial skills are subject to scale diseconomies, supporting a key assumption underlying the Berk and Green (2004) equilibrium of the mutual fund industry. They also suggest that asset expansions represent a transfer of rents from shareholders to managers.

Our paper contributes to the understanding of agency and governance issues in delegated portfolio management. Our results suggest that CEF shareholders have little capacity to extract rents from skilled managers, or to discipline unskilled ones. In particular, our finding of a convex relation between AUM growth and fund premiums is unique to the CEF structure. It demonstrates that managers and management companies react asymmetrically to fluctuations in investor demand for CEF shares, expanding AUM when demand is strong, while resisting to reduce it when demand is weak. This result is fundamentally different from the convex flow–performance relation widely documented for open-end equity funds, which is governed by investor reaction to past performance (see, for example, Sirri and Tufano (1998)). For OEFs, investor demand translates automatically into fund growth, therefore, the relation between demand and growth is inherently symmetric, irrespective of how investors react to past performance. An OEF manager cannot exploit the benefits of strong demand without bearing the consequence of weak demand, i.e., outflows. This may be an important reason why OEFs are more popular than CEFs among investors.[3]

Our paper also contributes to the understanding of CEF discounts. Our finding that outperforming managers are able to capture rents while poorly-performing managers are entrenched provides an explanation for why CEFs normally trade at a discount. This finding is consistent with the model of Berk and Stanton (2007). While their model focuses on fee increases as a channel for outperforming managers to capture rents, our results suggest that AUM expansions also play an important role. Our results also suggest that the response of fund premiums to

[3]Numerous papers have studied the response of fund flows to past performance of OEFs (see Christoffersen, Musto, and Wermers (2014) for a comprehensive review of this literature). Christoffersen (2001) and Warner and Wu (2011) have respectively studied fee waivers and contractual fee changes in OEFs.

past performance is not monotonic, because it is affected by anticipated endogenous AUM and fee adjustments. This helps explain why past studies generally find a weak relation between fund performance and premiums.

In addition, we contribute to the literature on returns to scale in active portfolio management by documenting diseconomies of scale at the CEF portfolio manager level.[4] Despite its importance, measuring returns to scale using OEF data is difficult due to the endogenous fund size adjustments that take place continuously, and the difficulty in measuring fund alphas.[5] CEFs provide a better opportunity to examine returns to scale because asset size is only adjusted infrequently, and because there exists a market-based forward-looking measure of fund performance, namely, the fund premium. Our study uses both NAV performance and premiums to infer the returns to scale.

Previous studies have explored how CEF discounts are related to fund governance. Specifically, Barclay, Holderness, and Pontiff (1993) find that CEF discounts are positively related to the aggregate fund shares owned by management and blockholders friendly to management, indicating that fund investors are wary of entrenched management. Gemmill and Thomas (2006) find similar results in a sample of UK CEFs. Coles, Suay, and Woodbury (2000) show that fund discounts are reduced when the compensation of the fund advisor is more sensitive to fund performance. Del Guercio, Dann, and Partch (2003) find that higher board independence is associated with lower expense ratios, but is not directly related to the level of fund premiums, a result we confirm in our sample. Our paper differs from these studies by focusing on the dynamics of AUM and fees at the portfolio manager level.

Several papers have examined the turnover of mutual fund managers, including Khorana (1996), Chevalier and Ellison (1999), and Wermers, Wu, and Zechner (2008). These papers focus on the termination of managers, based on analysis at the fund level. They are silent about how successful managers capture rents, which is a focus of this paper. The first two

[4]Since CEFs tend to hold less liquid assets than OEFs, they may face stronger diseconomies of scale. Therefore the exact magnitude of diseconomies of scale we find in this study may not be directly applicable to the OEF industry.

[5]Sometimes an OEF may choose to close to new investment, but this is relatively rare (see Bris, Gulen, Kadiyala, and Rau (2007)).

papers study OEFs, whose governance mechanisms are substantially different from those of CEFs due to share redeemability.[6]

The rest of this paper is structured as follows. Section 1 develops the hypotheses and empirical predictions. Section 2 describes the data and summary statistics. Section 3 investigates AUM adjustments in response to performance and premiums. Section 4 examines fee adjustments. Section 5 explores the effects of manager tenure and AUM on NAV performance and premiums. Section 6 examines the persistence of NAV performance and premiums, and the response of premiums to past performance and AUM growth. Section 7 concludes.

1 Empirical Questions and Hypotheses

1.1 Manager vs. shareholder power in CEFs

The number of CEF shares outstanding does not adjust continuously to reflect investor demand for a portfolio manager's services. The resulting over- or under-supply of CEF shares then leads to discounts or premiums of CEF share prices relative to their underlying net asset values. A premium indicates that the manager is expected to produce more value than the fees he charges, while a discount indicates that the net value added by a manager is perceived to be negative.

Despite the lack of an automatic fund size adjustment mechanism, there are several ways for skilled CEF managers to increase their compensation. For example, they can issue more shares through a seasoned equity offering, launch a new CEF, or start to manage additional existing funds. Alternatively, they can negotiate a fee increase, or move to a fund that charges higher fees. Similarly, there are a number of ways for CEF shareholders to discipline unskilled managers. For instance, the board of directors may fire an underperforming manager, or force the manager to lower fees or reduce AUM, either through a share repurchase, or by assigning additional managers to co-manage the fund.

[6]Dangl, Wu, and Zechner (2008) show that in the case of OEFs, due to the response of fund flows to performance, a fund management company has a strong incentive to fire underperforming managers, even without the intervention of the board. However, this incentive may be substantially weaker in the case of CEFs, as investor demand, which affects the fund premium, does not directly affect fee income.

In addition to monitoring by the board of directors, CEF managers are disciplined by external governance mechanisms. As shown by Bradley, Brav, Goldstein, and Jiang (2010), a fund with a high discount has a substantially higher chance of being acquired by an activist arbitrageur, such as a hedge fund, which then liquidates or open-ends the CEF. Such an outside threat has become an increasingly important component of the CEF governance system.

Many CEFs belong to a fund family that offers multiple funds. The role of the fund family in the investor-manager relation is subtle. On one hand, it has an incentive to fire underperforming managers, relocate them to funds with lower fees, or voluntarily waive fees to forestall more severe shareholder actions. These incentives are aligned with the interests of shareholders. On the other hand, the fund family has an incentive to promote well-performing portfolio managers to bigger funds or funds with higher management fees, or to launch new funds for them to manage. These actions increase the fee incomes of both managers and the fund family, but reduce the surplus of existing shareholders. Also, family discipline of underperforming managers may be ineffective, as fund families may be unwilling to shut down or downsize an underperforming fund in order to preserve fee income, or unwilling to fire an underperforming manager due to his personal connections within the fund family.

These considerations raise the question of the relative power of shareholders and managers in the closed-end fund industry. Or put differently, how effective is the CEF governance in the absence of the disciplining force imposed by the continuous threat of capital outflows? How entrenched are CEF managers? To what extent can CEF investors extract rents generated by portfolio managers? To facilitate the empirical investigation of these questions, we postulate two competing hypotheses, representing two polar cases:

Shareholder Surplus Hypothesis: *Shareholders have market power to extract rents from skilled managers, and fund governance is effective in disciplining unskilled managers.*

Managerial Rent Hypothesis: *Skilled managers have market power to capture rents, while unskilled managers are not well-disciplined.*

The Shareholder Surplus Hypothesis will hold if the costs of searching for a new job or launching a new fund are high, if strong bargaining power of shareholders makes it difficult

for outperforming managers to increase management fees, and if underforming managers can be replaced or forced to waive all or a portion of management fees relatively easily.[7] On the contrary, the Managerial Rent Hypothesis will be more relevant if it is easy for outperforming managers to pursue an outside option or launch a new fund, and difficult for activist arbitrageurs or existing shareholders to fire an underperforming manager due to entrenchment. In this case, managers tend to become overpaid after raising capital from investors, and CEFs tend to trade at a discount.

The dynamics of AUM and management fees are very different under these two hypotheses. In a world with diseconomies of scale, existing shareholders not only have an incentive to block fee increases, but also have an incentive to prevent AUM expansions, because expansions reduce expected future fund returns.[8] On the other hand, shareholders have strong incentives to force a reduction in fees or assets overseen by managers perceived to be unskilled. Therefore, if shareholders have market power and fund governance is effective, we should expect decreases in AUM and/or management fees after poor performance and high discounts, but no increases in AUM or management fees after good performance. By contrast, if managers have market power, and fund governance is weak, then we should expect the opposite.

1.2 Implications for fund performance and premiums

The relative power of shareholders and managers not only affects the AUM and fee dynamics, but also has testable implications for CEF NAV performance and premiums.

First, the relative power of shareholders and managers affects the relation between manager tenure and fund performance. If shareholders are able to fire unskilled managers relatively easily, and to retain skilled managers without increasing AUM and fees, we should expect NAV performance and fund premiums to be positively related to manager tenure. Alternatively, if skilled managers expand AUM and increase fees after good performance, while unskilled

[7] According to Weiss (1989), CEF IPO fees are roughly 4.5%. Also, any fee increase in CEFs or OEFs must be reviewed by the fund's board of directors and approved by shareholders.

[8] This conflict of interest is partly mitigated if an AUM expansion takes the form of issuing shares to existing shareholders (such as in a rights offering). However, as we show in Table 3, the most common method of manager AUM expansion is through adding another fund.

managers are not penalized accordingly, NAV performance and premiums should decline over manager tenure.

Second, the relative power of shareholders and managers affects the persistence of NAV performance and premiums. If shareholders can force reductions of AUM and management fees after poor performance relatively quickly, and can delay the increase of AUM and fees after good performance, then poor performance will be short-lived, while good performance will be persistent. By contrast, if outperforming managers can increase AUM or management fees relatively quickly, and underperforming managers are entrenched, then poor performance is persistent, while good performance is short-lived.

Third, the relative power of shareholders and managers also affects the relation between fund premiums and past NAV performance. If poor NAV underperformance can be reversed by corrective actions imposed by shareholders relatively quickly, while good NAV performance tends to persist, then fund premiums should respond more strongly to good than to poor NAV performance. Alternatively, if poor NAV performance is more persistent, then fund premiums should respond more strongly to poor NAV performance.

1.3 Returns to scale in CEF management

Our argument that the expansion of AUM represents a transfer of rents from shareholders to managers implicitly assumes decreasing returns to scale in active portfolio management. If returns to scale are increasing, both shareholders and managers benefit from AUM expansions. A conflict of interest arises if an expansion of AUM lowers expected future fund returns, as would be the case when returns to scale are decreasing.[9]

The empirical measurement of returns to scale in asset management faces two challenges. First, fund size is endogenously determined, that is, more talented managers tend to manage bigger funds. As a result, expected abnormal performance may not differ across funds of different sizes, even in the presence of diseconomies of scale. This is particularly true in the

[9]Some funds adopt a tiered fee structure, in which the fee ratio declines as the AUM increases. This mitigates the negative effect of diseconomies of scale on returns to shareholders, but whether it can fully offset diseconomies will depend on whether managers or shareholders exert more control in fee-setting.

OEF world, where fund size is almost constantly adjusted in response to investor beliefs about manager skills. Second, it is well-known that assessment of fund performance is difficult. The alpha estimate depends on the asset pricing model used, and is usually subject to significant noise. For OEFs, performance evaluation is further complicated by the fact that most OEFs issue multiple share classes, each having a different fee schedule targeting a different clientele, such as institutional vs. retail investors. Not surprisingly, the nature of returns to scale in portfolio management is still a subject of debate.[10]

CEFs provide a good opportunity to examine potential diseconomies of scale. First, high adjustment costs imply that the AUM of CEF managers can deviate from its equilibrium size for a relatively long time; such long-lasting deviations make the detection of diseconomies of scale possible. Second, fund premiums provides an observable, forward-looking measure of fund performance, which reflects investors' beliefs about the ability of managers to generate alpha in excess of fees in future periods.

2 Data, Variables, and Summary Statistics

2.1 Sample

Our sample covers essentially the entire universe of U.S. CEFs over the period from January 1985 to December 2010. This database is constructed mainly from two sources. First, we obtain investment objectives, weekly share market prices and net asset values, monthly total net assets, annual expense ratios, annual dollar values of management fees paid to fund advisors, and daily information on distributions from Lipper Inc. Second, we obtain manager information for both CEFs and OEFs from Morningstar Inc. The Morningstar database provides the start- and end-dates of each manager at each fund. We exclude managers who only manage OEFs. We link the Lipper and the Morningstar databases using fund CUSIP numbers, ticker symbols,

[10]Chen, Hong, Huang, and Kubik (2004) and Yan (2008) find that fund size indeed erodes fund returns, while Reuter and Zitzewitz (2015) find little evidence for decreasing returns to scale using a regression discontinuity approach. Pastor, Stambaugh, and Taylor (2015) find evidence of decreasing returns at the industry level, but not at the fund level.

fund names, and other fund information, such as inception dates. 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. Third, for about half of our Lipper-Morningstar sample, we obtain annual fund leverage data from Capital IQ, which covers the period from 1993 to 2010.

After eliminating a small number of convertible bond, preferred stock, real estate, and international bond funds, the Lipper database contains 717 funds that have weekly NAV data for at least two years (needed for some of our tests); 693 are matched to the Morningstar database.[11] We exclude funds designated as "team-managed" by Morningstar, since manager names for those funds are undisclosed. We also exclude a small fraction of observations (3.6%) where five or more persons are listed as fund managers at the same time. Our final sample consists of 679 funds managed by 1,137 individual managers, including 185 funds merged or liquidated before the end of our sample period. These funds fall into four categories: domestic equity (83), international equity (86), taxable bond (180), and municipal bond (330). This sample reflects an important feature of the U.S. CEF market: a large presence of bond funds, especially municipal bond funds.

2.2 Summary statistics of closed-end funds

Table 1 presents the summary statistics at the fund-year level, for both the full sample and each fund category. Definitions of fund-level variables are detailed in Appendix A.1. The average fund size, measured by total net assets (TNA), is $252 million. Each fund on average employs a management team of 1.71 members.

The CEF stocks generally trade at a price below the net asset value, with an average discount of 4.9% (i.e., a premium of -4.9%). Both the mean and the standard deviation of discounts are higher for equity funds than for bond funds, consistent with higher dispersion of potential manager skills, as well as higher uncertainty about skills, in equity funds. The NAV return and stock return represent returns on the assets held by a CEF and on the stocks

[11] We eliminate these very small categories, since most of our tests rely on a category-adjusted measure of performance or discount.

the CEF has issued, respectively. They both have a mean of 5.8% in our sample, suggesting that stock performance of CEFs closely mimics NAV performance in the long run, even though fluctuations of fund premium can drive a substantial wedge between them in the short run.

In order to generate higher returns on common equity, CEFs often use leverage, either by borrowing debt or issuing preferred stocks. The average leverage ratio is 22.3% in our sample. Municipal bond funds are the most levered (29.8%), followed by taxable bond funds (19.4%). In contrast, international equity funds use very little leverage (1.8%), perhaps because their assets are most volatile.

Management fee ratio is the ratio of annual fees paid to investment advisers (including co-advisers or sub-advisers in case they exist) to the average TNA over the year. Expense ratio captures both management fees and other expenses, including interest expenses (but not dividends on preferred equity), and fees paid to administrators, custodians, and directors, etc. Both ratios are net of any fees waived by investment advisors or other service providers. Management fees (0.8%) account for around one half of the total expense ratio (1.5%).

Liquidity gap captures the difference in liquidity of CEF stocks and of CEF holdings, designed to measure the liquidity benefits provided by the CEF structure, which allows investors to hold illiquid underlying assets without paying the costs of trading them directly. Since the underlying assets held by CEFs are not observable, we measure their illiquidity using NAV returns following an approach proposed by Getmansky, Lo, and Makarov (2004). Specifically, for each fund in each year, we estimate a first order moving average model using weekly NAV returns, and use the coefficient on the lagged noise term as a proxy for illiquidity.[12] We estimate the same coefficient using weekly stock returns to get a proxy for CEF stock illiquidity. The liquidity gap of a CEF is then calculated as illiquidity of CEF underlying assets minus illiquidity of CEF stocks. Consistent with the liquidity-based theory of closed-end funds advanced by Cherkes, Sagi, and Stanton (2009), CEF stocks are indeed more liquid than their underlying assets. The average liquidity gap is 0.237 for the whole sample.

[12]See Cao, Farnsworth, Liang, and Lo (2015) for an example that applies this measure.

2.3 Summary statistics of fund managers

Table 2 reports summary statistics at the manager-year level. Definitions of manager-level variables are detailed in Appendix A.2. Each manager manages on average 2.2 CEFs at a given point in time. CEF managers may also manage OEFs as well, in which case we label them as dual managers. The dummy variable *Dual* has a sample mean of 0.482, indicating that dual management is quite common for CEF managers.

Manager AUM is the sum of assets allocated to a manager across all CEFs at the year end. Since we have no information about the role each manager plays in a management team, the TNA of each fund is divided equally among all its managers at the year end. The average AUM per manager is $324 million, higher than the average fund size ($252 million).

To track the change of manager AUM due to deliberate actions such as share repurchases/issuances and new fund launches, we construct a variable called *Asset Growth*, which is the annual growth rate of a manager's AUM net of the growth attributable to realized NAV returns. This variable is similar to the fund flow in the OEF industry (see, for example, Sirri and Tufano (1998)), except that it is calculated at the manager level, and is more lumpy in nature. For example, when a manager departs from the CEF industry, his asset growth rate is -100% for that year. The average annual asset growth rate of managers in our sample is -10.3%. This negative number is due to two reasons. First, over our sample period of 26 years, 749 of the 1,137 managers leave our CEF sample. Each manager's departure generates an asset growth rate of -100%, even though the funds he used to manage may still be growing. Second, by construction, it does not include asset growth due to realized NAV returns.

Table 2 also reports the average tenure and fund age measured at the manager level. These variables are measured fund by fund at the year end, and then averaged across all funds managed by the same manager, with each fund weighted by the inverse of the number of its managers. Since both variables are highly skewed, we use their log transformations for our analysis. Other fund characteristics are aggregated to the manager level in the same way.

NAV Performance is the excess NAV return over the contemporaneous category mean, divided by the volatility of the excess return. It is calculated using weekly data and then annual-

ized. *Stock Performance* is calculated similarly using weekly stock returns. These performance measures can be interpreted along the line of the well-known Treynor-Black information ratio (Treynor and Black (1973)), which is the ratio of the mean to the volatility of the return relative to a benchmark. This ratio is widely used both in practice and in academic research. Since the mean of a fund's relative performance is normalized by its variability (i.e., the tracking error), it accounts for a manager's risk-tolerance and the noisiness of relative performance. This makes performance measures more comparable across different fund categories, which is an important advantage given the diversity of fund types in our sample.

As with most other fund characteristics, we adjust the fund premium by the contemporaneous category mean. This allows us to filter out the impact of common factors that drive the discounts of all funds in a certain market sector, such as time-varying investor sentiment. Since the dispersion of fund premium also differs substantially across fund categories, we further divide the category-adjusted premium by the contemporaneous cross-sectional standard deviation within the category. The resulting variable is called *Normalized Premium*, which represents the number of standard deviations from the average premium of the fund category.

Since *NAV performance*, *Stock Performance*, and *Normalized Premium* are scaled deviations from contemporaneous category means, they all have a sample mean that is close to zero. The same is true for all other category-adjusted fund characteristics. The standard deviation of *NAV performance* (1.373) is substantially larger than that of *Stock Performance* (0.810). This is because the volatility of category-adjusted stock returns, which is the denominator of the information ratio, is substantially larger than the volatility of category-adjusted NAV returns.

3 The Dynamics of AUM

We first perform a test of the Shareholder Surplus and the Managerial Rent Hypotheses by investigating how manager AUM responds to NAV performance and fund premiums.

3.1 AUM expansion, contraction, and manager departure

Unlike an OEF, the number of shares outstanding for a CEF changes infrequently, i.e., its asset size is relatively stable. However, at the individual portfolio manager level, AUM can change more frequently, as the number of funds under management can increase or decrease. Given the discrete nature of AUM adjustment for CEF managers, a large part of our analysis focuses on significant expansions or contractions in a manager's AUM. Such major movements in the career path of CEF managers are more likely to reflect the deliberate actions of either the manager, management company, or shareholders.

We define an AUM expansion (contraction) as an increase (decrease) of manager AUM by more than 50%.[13]. Note that the asset growth rate is net of realized NAV returns. We separately identify a case in which the AUM drops to zero (i.e., by -100%), and refer to it as a "manager departure." A simple count of such events is reported in Panel (A) of Table 3. According to our definitions, there are 337 expansion, 192 contraction, and 759 departure events in our sample.

An AUM expansion can occur for various reasons. For example, a manager's AUM jumps discretely when he starts managing an additional fund, when his current fund issues shares, or when the management team of his fund shrinks. Panel A of Table 3 reports the number of expansions that occur under each scenario. It shows that most expansions are due to an increase in the number of funds managed (239 out of 337). Similarly, most contractions are due to a decrease in the number of funds managed (103 out of 192).

A manager may simply retire as he ages. Retirements are likely to be independent of past performance, and are uninteresting for our analysis. We, therefore, remove from the departure sample 51 cases in which the departing managers were at age 60 or above, a proxy for a retirement-motivated departure. The remaining 708 departures are assumed to be due to non-retirement reasons.[14]

[13] We have used other cutoff points to define the "expansion" and "contraction" events, with similar results.

[14] Admittedly, our identification of retirements is noisy due to data limitations, which biases against finding significant results. For 43% of managers in our sample, Morningstar provides either the birth year or the year in which a bachelor's degree is received. Through internet searches, we are able to obtain such information for another 34% of managers. We use the year of the bachelor's degree minus 22 to infer a manager's birth year,

If CEF governance is effective, and the industry is able to retain skilled managers, non-retirement departures should consist mainly of departures of unskilled managers and therefore, be preceded by poor NAV performance and high discounts. In contrast, if governance is weak, and the industry tends to lose its best talent, non-retirement departures will consist mainly of skilled managers taking better outside options and therefore, be preceded by good performance and high premiums. Which scenario is closer to reality is an empirical question.

3.2 Determinants of AUM events

To examine the determinants of AUM expansion, contraction, and manager departure events as defined above, we use multilogit regressions, where the dependent variable is +1 for expansion, -1 for contraction, -2 for non-retirement departure, and zero otherwise (the base case). We account for variation in AUM that is common across funds (such as a wave of CEF originations) by controlling for year fixed effects, and account for error clustering at the manager level.[15]

Table 4 presents estimated coefficients for two models, each with three columns representing different outcomes. In Model 1, we regress the outcome indicator variable on average NAV performance during the prior two years, normalized fund premium and average premium of the fund category at the prior year end, as well as other lagged control variables, including lagged AUM, manager tenure, and fund age (all under log transformation), and a dummy variable (*Dual*) indicating whether a manager also manages at least one OEF as of the prior year end. Since NAV performance is measured by the information ratio using the category mean as the benchmark, it is an explicit indicator of a manager's realized performance relative to his peers (normalized by the tracking error). The two-year (instead of one-year) NAV performance is used because the discrete outcomes we examine (e.g., manager departure or promotion) most

if the latter is not available. We assume a departure is due to non-retirement reasons if neither the bachelor degree year nor the birth year is available.

[15]Results are similar if we also control for manager fixed effects. However, the number of observations decreases significantly because managers whose outcome variable is constant over the sample period drop automatically out of the estimation. From an economic point of view, a model without manager fixed effects has the advantage of exploiting variation both within and across managers, while a model with manager fixed effects focuses on within-manager variation, and leaves the mean differences across managers unexplored. For example, the latter model does not answer the question whether underperforming managers are on average more likely to depart than outperforming ones.

likely occur with some lag. The normalized premium is an indicator of investor perceptions of a manager's future value-added, relative to his peers. The lagged category mean of fund premiums is an indicator of investor demand for funds in a certain sector or style, for either rational or behavioral reasons.

The results from Model (1) show strong evidence of AUM expansion (outcome 1) in response to both good category-relative NAV performance and high normalized premium. The coefficients on both *NavPerf* and *Premium* are significant at the 1% level. This suggests that, despite frictions in the adjustment of CEF fund size, recent well-performing managers, and managers perceived to deliver high value-added in the future, have a significantly higher probability of expanding their AUM. Interestingly, the coefficient on *Premium(Category)* is also significantly positive, suggesting that managers not only capitalize on positive investor perceptions about themselves, but also take advantage of favorable views about their fund sectors. Since sector-level premiums are more likely to be affected by investor sentiment, this result indicates that managers exploit opportunities arising from positive investor sentiment.

In contrast, AUM contraction (outcome -1) is insensitive to past NAV performance, normalized premium, or category premium, suggesting that there are significant frictions preventing an AUM reduction when a manager delivers poor performance, or when his funds or fund category is out of favor with investors.

On the other hand, the results on manager departures do suggest a certain degree of discipline imposed on managers. The negative coefficients on *NavPerf* and *Premium* in the first column (for outcome -2) suggest that poorly-performing managers face a higher probability of exit from the industry. Thus, instead of losing more talented managers, the CEF industry is, on average, more likely to drive out the unskilled. However, the magnitude of the coefficient on *Premium* is much smaller (in absolute value) in column one than in column 3 (-0.118 vs. 0.346), and a χ^2-test shows that this difference in magnitude is statistically significant (with a P-value of 0.015). Furthermore, departure does not show any sensitivity to the average premium of the fund category.

There are a few other notable results from Model (1). Manager tenure negatively predicts

AUM expansion. This may arise because long-tenure managers are generally older, and therefore less likely to be promoted; or because long-tenure managers tend to underperform, and their poor performance is not fully captured by our performance measure, which tracks only performance during the two prior years. AUM negatively predicts expansion, and positively predicts contraction, suggesting a tendency of mean reversion in AUM, potentially toward a certain optimal economic scale in each category. It negatively predicts manager departures, suggesting that managers with large AUM, an indication of their past success, are less likely to leave the industry. Fund age is negatively correlated with the probabilities of expansion and departure, suggesting that managers of older funds are less likely to leave or expand their AUM, perhaps because these funds have already reached their optimum economic scale. Furthermore, dual managers are less likely to leave, potentially because those managers are in general more skilled.

Overall, the results from Model (1) suggest that, while managers are rewarded for good NAV performance and penalized for poor NAV performance, the consequences that result from investor perceptions about future performance are asymmetric. When investor perceptions are positive, manager AUM expands; when it is negative, managers are not penalized accordingly. This asymmetry indicates that CEF managers and management companies behave opportunistically toward investor perceptions, perhaps because premiums and discounts can be interpreted selectively. For example, managers may take credit for a high premium, but blame a high discount on investor sentiment or irrationality. Clearly, this supports the Managerial Rent Hypothesis instead of the Shareholder Surplus Hypothesis.

Model (2) examines how manager tenure and the status of being a dual manager affect the impact of past performance and past premium, using interaction variables. Interestingly, manager tenure significantly mitigates the negative impact of NAV performance on manager departure. The positive coefficient of 0.222 on *NavPerf*Tenure* indicates that, for a manager whose log transformed tenure is one standard deviation (0.731 from Table 2) above the mean, the coefficient of NAV performance changes from -0.307 to -0.145 (=-0.307+0.222*0.731), a decline of 53% in absolute value. In contrast, the impact of NAV performance on expansion is

not significantly affected by tenure. The lower performance-sensitivity of departures of long-tenure managers can arise either because there is lower uncertainty about those managers' skills, or because they are more entrenched. However, the asymmetry in the interaction effect of tenure and NAV performance on departures and on expansions suggests that the second interpretation is more likely to be true.

The status of being a dual manager does not seem to alter the sensitivities of AUM events to NAV performance or premium, as the coefficients on both interaction terms involving the dual manager dummy are statistically insignificant. This may be a result of the joint effect of two counteracting forces. On one hand, dual managers are generally more skilled (as we show in Table 7 below). This potentially gives them more power, makes them less likely to be punished after poor performance, and more likely to expand assets after good performance. On the other hand, unlike CEF-only managers, dual managers are also disciplined and rewarded by OEF flows. If a dual manager underperforms, the management company may have a stronger incentive to intervene, because otherwise the company suffers from a loss of flows on the OEF side. If, on the contrary, a dual manager outperforms, the incentive to expand CEF assets may be weaker than for a CEF-only manager, because the expansion may have already been achieved through flows to his OEFs. Together, these two counteracting forces may lead to an insignificant interaction effect.

We have also separately examined the subsamples of equity and bond fund managers. In both subsamples, we find that high fund premiums strongly predict AUM expansion, but that the impact of high discounts on AUM contraction and manager departure is substantially weaker (or even in the wrong direction). Also, a long manager tenure significantly reduces the impact of poor NAV performance on the probability of departure in both subsamples. Interestingly, the interaction effect of *Premium* and *Tenure* on AUM expansion is insignificant for equity fund managers, but is significantly positive for bond fund managers, suggesting long-tenure bond managers have more power to exploit high premiums. In addition, for equity fund managers, the negative relation between manager tenure and AUM expansion becomes insignificant after controlling for manager age, but it is still highly significant for bond fund

managers. This suggests that for bond fund managers, a long tenure may serve as an additional indication of poor performance (beyond what is reflected in the past two-year NAV performance).[16] In the interest of brevity, these subsample results are not tabulated.

3.3 AUM growth rate

We next examine the continuous asset growth rate, rather than focusing on changes beyond a certain threshold. We recognize that AUM adjustment in CEFs occurs mostly in discrete steps. Nevertheless, the continuous asset growth rate is a useful summary of adjustments, both small and large. Again, note that the asset growth rate is net of realized NAV returns. Also, a manager departure is counted as an asset growth rate of -100%. Therefore, our analysis also captures managerial discipline reflected in departures. In addition, we adjust the asset growth rate by the contemporaneous mean of the manager's fund category, so that it is not affected by common factors driving sector-wide asset growth.[17] The Shareholder Surplus Hypothesis predicts poor performance and discounts to have a stronger impact on AUM growth than good performance and premiums, while the Managerial Rent Hypothesis predicts the opposite.

Panel (a) of Figure 1 plots the average category-adjusted asset growth for quintiles of managers sorted on lagged two-year NAV performance. It demonstrates a convex relation between asset growth rate and lagged NAV performance in quintiles 2 to 5, and a steep decline of the asset growth rate from quintile 2 to quintile 1, suggesting that modest underperformance is tolerated, but severe underperformance triggers manager exits. This is consistent with our results in Table 4, which show that NAV performance predicts expansions and manager departures, but not contractions. Panel (b) plots the average category-adjusted asset growth for quintiles of managers sorted on lagged normalized premium, and exhibits a similar pattern, but the overall convexity is more pronounced, consistent with the stronger impact of premium on expansions than on contractions or departures reported in Table 4.

[16] Consistent with this interpretation, Section 5 shows that underperformance of long-tenure managers is more significant in bond funds than in equity funds.

[17] A small number of managers manage funds in more than one category. In such cases, which account for 2.8% of the manager-year observations, we assign the manager to the category in which his AUM is largest.

Table 5 reports regression results. Column (1) indicates that both NAV performance and premium level strongly predict the growth rate of manager AUM. In column (2), we introduce two dummy variables, *HighN* and *HighP*, to indicate whether the *NavPerf* and *Premium* are above zero (i.e., whether a manager outperform his peer group in terms of NAV returns and premiums), and interact each of them with *NavPerf* and *Premium*, to capture potential nonlinearity. We also allow the sensitivities of asset growth to NAV performance and premiums to change with tenure, and to differ between dual and CEF-only managers. In columns (3) and (4), we report results separately for equity and bond fund managers.

The effect of lagged NAV performance on asset growth seems largely symmetric for the full sample, as the coefficient of the interaction term *NavPerf*HighN* is close to zero; however, there is a significant asymmetry in the effect of lagged premium, as indicated by the positive coefficient on *Premium*HighP*. Consistent with our previous multilogit results on discrete AUM expansion/contraction, a high premium has a stronger impact on asset growth than a low premium. In fact, the relation between growth and premium is negative, although insignificant, when the premium is below average. This suggests that managers enjoying a favorable investor perceptions expand their AUM, while those who are unfavorably perceived do not suffer a proportionate reduction in AUM.

Columns (3) and (4) show that the convexity in the premium-growth relation is significant for both equity and bond fund managers, suggesting that this is a common feature among CEF managers. However, the relation between NAV performance and asset growth is opposite in the two subsamples: it is concave for equity fund managers, and convex for bond fund managers, as indicated by the opposite signs of the coefficients on *NavPerf*HighN*. This indicates that bond CEF managers may have more market power and may be more entrenched than equity CEF managers, perhaps because they face less competition from OEFs, as the illiquidity of underlying assets makes the open-end structure less desirable (Deli and Varma (2002)).

The convex growth-premium relation we document is unique to CEFs, and is fundamentally different from any performance-flow relation in OEFs. The premium or discount reflects investor demand for CEF shares, which, in turn, can be driven by past performance, investor

sentiment, or other indicators of manager skills. In the open-end fund industry, fluctuations in investor demand translate automatically to fluctuations in AUM. Therefore, the relation between investor demand and AUM adjustments is inherently symmetric. However, this is not the case for CEFs, as changes in AUM require the concomitant action by managers or management companies. If the management does not perceive an adjustment to be in its best interest, then there will be a wedge between the desires of shareholders and the actual change in AUM. Our results suggest that managers' reaction is asymmetric. The AUM expands when investor perceptions are favorable, but it does not shrink accordingly when they are unfavorable. This asymmetry strongly supports the Managerial Rent Hypothesis.

The growth-performance relation we document in CEFs is also in sharp contrast with prior findings on OEF flows. The literature on OEF flows has generally shown a convex flow-performance relation for equity funds (see, for example, Sirri and Tufano (1998), Huang, Wei, and Yan (2007), and Sialm, Starks, and Zhang (2015)). Chen, Goldstein, and Jiang (2010) show that this convexity is weaker when the underlying assets are illiquid, which they explain by strategic complementarities among OEF investors due to share redeemability. Consistent with this explanation, a recent study by Goldstein, Jiang, and Ng (2015) find that the flow-performance relation is strongly concave for open-end corporate bond funds. Our findings of a concave growth-performance relation for equity fund managers and a convex relation for bond fund managers suggest, as we expect, that the economic mechanism driving AUM adjustments in the CEF industry is very different from that driving fund flows in the OEF industry. While fund flows in OEFs are solely determined by investors, the AUM adjustments in CEFs are implemented by the manager and management company.

4 The Dynamics of Management Fees

In this section, we examine how management fees respond to NAV performance and premiums. Both the Shareholder Surplus and the Managerial Rent Hypotheses predict an asymmetric response of fees to manager performance, but the asymmetry goes in opposite directions.

Our management fee ratios are calculated using the annual dollar amount of fees, net of any fee waivers, divided by the average total net assets over a given year. Therefore, it captures both changes in the contractual fee schedule and voluntary fee waivers. We use management fees instead of total expenses to capture revenues generated by fund managers because many components of total expenses, such as custodial, administrative, and recordkeeping fees, are often paid to third-party service providers, and therefore, are unrelated to management's ability to extract surplus from shareholders. In addition, total expenses of a CEF include interest paid to banks or other lenders, which varies over time as the fund's leverage ratio changes. We recognize that the definition of what constitutes management fees varies across different fund management companies, which creates noise in the comparison of fees across companies. This concern is mitigated in our case because we study the *change* of fees at the manager level. Therefore, persistent differences in the definitions of fees across companies are largely differenced out.

Since small changes in fee ratios are noisy, we focus on changes that are economically significant. Specifically, we calculate changes in the manager-level management fee ratio in each year, and identify cases in which the change is bigger than 10% of the lagged average annual fee ratio in the manager's fund category. Panel B of Table 3 presents a summary of such changes. There are altogether 499 (472) fee increase (decrease) events. Since our sample consists of 6,962 observations at the manager-year level, this represents an annual fee change frequency of 13.9%. The average change is around 35 basis points in each direction, representing around 40% of the lagged category mean of annual fee ratios. The median change is around 20% of the lagged category mean.

Warner and Wu (2011) examine a large sample of open-end fund advisory contracts. They find that the semiannual contract change frequency is approximately 5% (or 10% per annum), with contract changes often shifting the percentage fee up or down by more than one-fourth. The slightly higher fee change frequency in our sample can be explained by two reasons: First, managers switch between funds with different fee ratios. We find that, in 136 (145) out of the 499 (472) fee increase (decrease) cases, the list of funds managed by a manager changes

at least partially. This highlights the additional flexibility of fee adjustment at the manager relative to the fund level. Given the same fund size, the fee income of the management company is more sensitive to the performance of high-fee funds than to the performance of low-fee funds. Therefore, the management company has an incentive to relocate outperforming managers from low-fee to high-fee funds. Such a relocation can increase the total fee income of the management company, and potentially the compensation of relocated managers as well, while keeping fee ratios of individual funds unchanged. It provides an alternative way for the management company to capture rents, especially when a fee increase faces strong resistance from shareholders or the board of directors.

Second, leverage changes. CEFs usually charge fees based on total, instead of net assets under management. As a result, as the leverage ratio changes, the fee ratio based on net assets also changes. Out of 499 (472) cases of fee increase (decrease) events, we find 56 (30) cases in which at least one of the funds under management increases (decreases) the leverage ratio by more than 5 percentage points. Since we have leverage data for only about half of the funds in our sample, the actual number of fee changes accompanied by a leverage change of such magnitude is likely to be twice as high.[18]

Table 6 shows results on the determinants of fee changes from multilogit regressions. The dependent variable is equal to -1 for fee decreases, and +1 for fee increases, and zero otherwise. The set of independent variables is similar to that in Table 4 for the AUM analysis, but with three additions: the lagged category-adjusted asset growth rates at both the manager and family levels, and the lagged category-adjusted fee ratio. The lagged asset growth rates account for fee changes due to potential economies or diseconomies of scale, while the lagged fee ratio accounts for potential mean reversion in fees.

The results in Model (1) show that past NAV performance and normalized premium significantly predict fee increases, but neither predicts fee decreases: management fees tend to

[18]In OEFs, changes in effective fee ratios are often due to management companies introducing or dropping fee waivers (Christoffersen (2001) reports that over half of open-end money market funds waive fees in a typical year in her sample). However, this is not the case with CEFs. We have data on whether a CEF waives fees in a given year from 1985 to 2006, which covers about two-thirds of our fund-year observations. The fraction of fund-years with a fee waiver is only 13.6%. Out of the 377 (351) fee increase (decrease) events during this sub-period, we find that only 33 (28) of them involve a drop (introduction) of a fee waiver.

increase following good NAV performance and high premiums, but they do not fall following poor NAV performance or high discounts. In line with our AUM growth results in the last section, these results support the Managerial Rent Hypothesis. Subsample analysis shows that this asymmetry is mainly driven by bond fund managers, which again indicates that these managers are more entrenched than equity fund managers.

Fees also respond significantly to the average premium of the fund category, but in a more or less symmetric way. Management fees also tend to be mean-reverting, since the lagged category-adjusted fee level is significantly related to the probability of a fee reduction. This suggests a certain degree of competitive pressure in fee-setting among peer funds. However, there is no evidence that asset growth at either the manager or the family level has significant predictive power for fee changes. This suggests that any benefits of economies of scale, if they exist, are not passed on to investors in the form of lower fees.

In Model (2), we allow the impact of NAV performance and premiums on fees to vary with tenure, and to differ between dual and CEF-only managers. However, none of the interaction terms has a coefficient that is statistically significant, suggesting that neither of these manager characteristics significantly alter the sensitivities of fees to NAV performance and premiums. The coefficients on other variables are largely the same as in Model (1).

We also perform these tests separately on equity and bond fund managers. In both subsamples, we find that the category mean of fund premiums significantly predicts fee increases, but not fee decreases. However, the asymmetries in the response of fee changes to the manager-level NAV performance and fund premiums observed in the full sample are mainly driven by bond fund managers. Furthermore, the interaction effect of NAV performance and manager tenure on fee increases is significantly positive in bond funds but insignificant in equity funds, indicating that the probability of a fee increase after good performance is higher as a bond fund manager's tenure increases. Like the results on AUM events and AUM growth, these results indicate again that bond fund managers have more power than equity fund managers.

Our results differ significantly from previous findings on OEF fee adjustments. Christoffersen (2001) shows that money market funds tend to waive more fees when they underperform,

and that funds use fee waivers strategically to increase expected fund flows. Warner and Wu (2011) find that OEFs with superior performance are more likely to increase fees, but they also find that high asset growth at both fund and family levels are associated with a higher probability of fee decreases. These results suggest that, due to the mobility of OEF investors, OEF managers have stronger incentives, or face higher pressures, to absorb fee losses from poor performance, and to share benefits from increased scale with investors.

To summarize our results on AUM and management fee adjustments, we find that CEF managers capitalize on good past performance and favorable investor perceptions about their future performance, as reflected in fund premiums, through AUM expansions and fee increases. However, the penalties for poor past performance or unfavorable investor perceptions are either insignificant, or substantially mitigated by manager tenure. These findings provide support for the Managerial Rent Hypothesis instead of the Shareholder Surplus Hypothesis.

5 Effects of Manager Tenure and AUM Size

We now test the Shareholder Surplus Hypothesis against the Managerial Rent Hypotheses by investigating the effects of manager tenure on NAV performance and premiums. Given that well-performing managers are rewarded by asset expansions, it is interesting to analyze whether existing shareholders are hurt by such expansions. For this reason, we also examine the relation of a manager's NAV performance and fund premium with the size of his AUM.

5.1 Results on NAV performance

Table 7 reports the results for several models that explain NAV performance. We control for manager fixed effects, so that the results are not affected by constant manager-specific characteristics, such as risk preference or IQ.[19]

Model (1) regresses manager NAV performance on lagged tenure, AUM, expenses, and fund age, as well as a dummy variable indicating a dual manager. The results suggest a significant

[19]Since all variables are adjusted by their contemporaneous means, we have effectively also controlled for year fixed effects.

entrenchment effect. NAV performance is significantly negatively related to manager tenure, with a coefficient of -0.257. All else equal, if a manager's log transformed tenure increases by one standard deviation (0.731) from the industry average, the NAV performance, measured by the information ratio, decreases by 0.188, which is about 13.7% of the standard deviation (1.373) of this measure in our sample. Taking domestic equity funds as an example, the average tracking error, i.e., the volatility of category-adjusted NAV returns, is 12.07% on an annual basis. Thus, a decrease of the information ratio by 0.188 translates to a decline of peer-adjusted NAV return of 2.27% per annum. This is an economically significant effect.

Model (1) also shows a negative relation between NAV performance and manager AUM, significant at the 1% level. This provides support for decreasing returns to scale. The coefficient on AUM is -0.238, suggesting that NAV performance measured by the information ratio declines by 0.295, or 0.21 standard deviations, if a manager's category-adjusted *log(AUM)* increases by one standard deviation (1.240). Again, this is an economically large effect.

The coefficient on the dual manager dummy is significantly positive. Since we estimate our model using manager fixed effects, this suggests that dual management of CEFs and OEFs is more likely to happen at the more productive time of a fund manager's career. However, given that managers have only limited time and attention, it is interesting to see whether the size of OEF assets hurts a dual manager's performance in CEFs. We perform a test of this in Model (2) using the sample of dual managers. We replace the lagged dual manager dummy by the lagged category-adjusted logarithm of a manager's OEF AUM, constructed in the same way as the CEF AUM.

The result confirms a negative spillover of OEF asset size on CEF performance, statistically significant at the 5% level. This is interesting new evidence in favor of decreasing returns to scale at the portfolio manager level in investment management. Compared to the direct impact of CEF asset size, the negative spillover effect of OEF asset size appears to be smaller in magnitude (-0.062 vs. -0.246). This is not surprising because the two sets of assets may not pursue exactly the same investment strategies, which partly mitigates the scale diseconomies. Notably, the negative tenure effect on NAV performance is largely the same in the dual manager

sample as in the full sample, indicating a similar entrenchment effect for both dual managers and CEF-only managers.

If the negative tenure-performance relation is due to manager entrenchment, we should expect it to be more significant as manager tenure rises above a certain threshold. At the early stage of a manager's tenure, the benefits from increasing experience should at least partly offset the negative effect of entrenchment. Also, we should not assume that all managers with long-tenure are entrenched and unskilled, as some may have a long tenure simply because they fit their jobs well. In fact, as tenure increases, investors learn more about the managerial skills, and their perceptions about his future performance, reflected in the fund premium, should be more accurate. This suggests that the performance of long-tenure managers should depend on the level of the fund premium.

To test these conjectures, we introduce two extensions to Model 1. First, we add an interaction term of *Tenure* with a dummy variable, *Long*, which equals 1 if the log transformed manager tenure is above the contemporaneous sample mean, and zero, otherwise. This piecewise linear model allows the slope of NAV performance to change as the variable, *Tenure*, crosses zero. Second, we add an interaction term of lagged manager tenure times lagged normalized premium to allow the tenure-performance relation to vary with the level of the normalized premium.

The results presented in column (3) provide further support for the Managerial Rent Hypothesis. For managers whose (log transformed) tenure is below average, the relation between tenure and NAV performance is insignificant, with a coefficient close to zero. However, for managers whose tenure is above average, this relation is strongly negative. Therefore, the negative tenure effect on NAV performance shown in Model (1) is almost entirely due to long-tenure managers, suggesting that at the early stage of manager tenure, the negative entrenchment effect is partly offset by the positive effect of increasing experience.

The results also support the conjecture that premiums are informative about future performance for long-tenure managers. The positive coefficient on the interaction term, *Tenure*Premium*, is significant at the 1% level. This means that long-tenure managers with a high discount per-

form significantly worse, in the future, than those with a high premium. Thus, investors are able to distinguish between (entrenched) unskilled and the skilled long-tenure managers. This result provides strong support for the managerial performance theory of the CEF discount(Ferguson and Leistikow (2001), Ross (2002)). Interestingly, investors seem to have great difficulty in evaluating the skills of short-tenure managers, as their premiums fail to predict NAV performance (the coefficient on *Premium* is insignificant). This is likely due to the lack of a sufficient track-record for those managers, both in terms of fund performance and other information about their innate skills.

Elton, Gruber, Blake, and Shachar (2013) find that CEF performance is boosted by the use of leverage. To investigate whether the results above are driven by leverage, we perform the same analysis on the subsample of managers for whom leverage data are available from Capital IQ, controlling for category-adjusted fund leverage. The results are reported in column (4). Leverage enhances NAV performance significantly, confirming the finding of Elton, Gruber, Blake, and Shachar (2013). Apparently, CEF managers, on average, are able to generate returns above their borrowing costs. It is also important to note that the negative effects of tenure and AUM on NAV performance remain virtually unchanged after controlling for fund leverage, even though the number of observations drops by 40% due to missing leverage data.

Columns (5) and (6) present separate results for equity and bond fund managers, respectively. These subsample results are largely consistent with the full-sample results. The coefficient on *Tenure*Long* is insignificant, but its point estimate is not much different from the full-sample estimate, suggesting that the lack of statistical significance is a matter of power due to the smaller sample size. The same coefficient is significantly negative for bond fund managers, with a point estimate that is larger in magnitude. Thus, bond fund managers appear to be more entrenched than equity fund managers, consistent with our earlier results on AUM and fee adjustments.

5.2 Results on premiums

We now examine how manager tenure and AUM are related to normalized fund premiums, which reflect investor perceptions about future performance. Table 8 shows results separately for all managers, equity fund managers, and bond fund managers. Within each group, we estimate two models. One model controls for leverage (for which we have data only for a subsample of funds), while the other does not. Our main variables of interest are the interaction term *Tenure*Long* and AUM. We control for lagged NAV performance (averaged over the prior two years), dividend rate, expense ratio, fund age, dual manager dummy, as well as the liquidity gap between CEF assets and CEF stocks (defined as the illiquidity of portfolio assets minus the illiquidity of CEF shares).

The coefficient on *Tenure* itself is insignificant, which implies that premium does not depend on tenure for managers whose tenure is below average, suggesting that investors do not view entrenchment as a significant concern for such managers. However, the coefficient on the interaction term *Tenure*Long* is consistently negative in all six columns, and statistically significant Columns (1), (2) and (4), suggesting that investors view a further increase in tenure as a negative factor for performance, once it is above average. This finding is consistent with the entrenchment of long-tenure managers, and provides support for the Managerial Rent Hypothesis.[20] Also, the coefficient on AUM is consistently negative, and significantly so in five of the six columns, suggesting a recognition of the negative effect of size on *future* performance by investors when they price CEF shares.

Lagged NAV performance is positively related to normalized premium in all three samples in the model without leverage, suggesting investors use past performance to infer future performance, at least to some degree. Dividend rate is strongly positively related to fund premiums, consistent with the findings of Cherkes, Sagi, and Wang (2014) and Wang and Nanda (2011), and with the CEF pricing theory of Ross (2002). Somewhat surprisingly, the expense ratio is not significantly related to premium, perhaps because expense ratios are highly endogenous, as

[20]The fact that the coefficient on *Tenure*Long* is more negative for the equity fund managers than for bond fund managers, despite the fact that long-tenure bond fund managers are more likely to underperform, suggests that investors may underestimate the negative effect of entrenched long-tenure bond fund managers.

suggested by our fee adjustment results in Section 4. The coefficient on leverage is positive for all three samples, but is significant only for the joint sample of equity and bond CEF managers.

According to the liquidity-based theory of Cherkes, Sagi, and Stanton (2009), the CEF premium should be positively related to the liquidity gap, designed to measure the liquidity benefits provided by CEFs. However, this prediction only receives limited support in our data. The coefficient on *LiquidityGap* is significantly positive only for bond fund managers before we control for leverage. The lack of a strong liquidity gap effect may be as follows. As Cherkes, Sagi, and Stanton (2009) argue, CEF liquidity benefits should be highly correlated within fund sectors. The premiums we analyze are adjusted by the category mean, thus, the majority of variation in CEF liquidity benefits are already filtered out. Furthermore, we estimate our model with manager fixed effects, therefore time-invariant differences across managers are also filtered out. The remaining effect of liquidity gap may therefore be insignificant.

5.3 The role of boards of directors

One important institution that is designed to safeguard the interests of investors is the fund's board of directors. There is an extensive literature on the role of boards in corporate governance (see Hermalin and Weisbach (2003) for a review of this literature). For the mutual fund industry, Tufano and Sevick (1997) find that smaller and more independent boards are associated with lower fund expenses, suggesting that those types of boards are more effective in mitigating agency issues in delegated portfolio management. Del Guercio, Dann, and Partch (2003) find similar results in closed-end funds. We now test whether these board characteristics are related to performance, fees, and entrenchment in our sample.

We collect data on board characteristics, including the number of independent ("disinterested") directors and the total number of directors, for three years: 1996, 2001, and 2006.[21] We extrapolate each snapshot of data to the four subsequent years, assuming that it stays

[21] We thank Diane Del Guercio for sharing her hand-collected CEF director data for the year 1996, and thank Lipper for providing the director data for the year 2006. We downloaded the CEF proxy statement filings (Form DEF 14A) for the year 2001 from the EDGAR system of the U.S. Securities and Exchange Commission, and manually collected the board structure information from those filings. After merging with these data sets, we obtain board structure data for 277 funds in 1996, 233 funds in 2001, and 523 funds in 2006.

constant during those years. Given that fund board structures are relatively stable over time, we believe that this is a reasonable approximation.

Table 9 presents the results. In Model (1), we test whether board size and board independence are directly related to NAV performance, controlling for other fund characteristics. Neither of them shows a significant effect. In Model (2), we test whether smaller board size and higher board independence alleviate the negative tenure-performance relation, an indicator of manager entrenchment. The coefficient on the interaction term *Tenure*Independence* is positive, and the coefficient on *Tenure*BoardSize* is negative, suggesting entrenchment is less severe when boards are smaller and more independent. However, neither coefficient is statistically significant. Notably, the coefficient on *Tenure* is significantly negative in both models, further confirming a negative effect of tenure on NAV performance.

Models (3) and (4) repeat the same tests for normalized premiums. Again, we do not find statistically significant evidence that board structure affects premiums, either directly or through an interaction term. This is consistent with the findings of Del Guercio, Dann, and Partch (2003), who report mixed evidence on the relation between board size and premiums, and an insignificant relation between board independence and premiums. The effect of tenure on premiums is significantly negative, confirming an earlier result in Table 8.

Model (5) and (6) examine the effects of board structure on category-adjusted management fee and expense ratios. Consistent with Tufano and Sevick (1997) and Del Guercio, Dann, and Partch (2003), more independent boards are associated with significantly lower fees and expenses, suggesting independent directors pay close attention to fees and expenses, and help to negotiate lower fees on behalf of fund investors. However, the effect of board size is insignificant.

Overall, the results in this section strongly support the Managerial Rent Hypothesis. Long-tenure managers deliver poorer NAV performance as their tenure increases further. Investors appear to recognize the negative impact of entrenched managers, and exhibit some ability in distinguishing between entrenched and skilled long-tenure managers. Board structure does not have a significant relation with NAV performance or premium, but greater board independence is associated with lower fees and expenses. The results also show strong effects of diseconomies

of scale at the manager level, both in realized NAV performance and in the manager's future value-added perceived by investors.

6 Dynamics of Premiums and NAV Performance

In this section, we shed further light on the two sets of competing hypotheses by investigating the time-series properties of premiums and NAV performance, as well as the response of fund premiums to NAV performance and AUM growth.

6.1 Persistence of NAV performance and premiums

We first look at the time series properties of NAV performance and premiums. As stated in Section 1, strong shareholder power implies persistence of good NAV performance and high premium. By contrast, strong managerial power predicts higher persistence of high discount and poor NAV performance.

Table 10 tests these alternative hypotheses. First, Model (1) shows that the normalized premium strongly persists, but that the persistence of an above-average premium is significantly lower (i.e., stronger mean-reversion). The coefficient on the interaction term *HighP*Premium* is significantly negative, where *HighP* equals 1 if the normalized premium is positive, and zero, otherwise. Model (2) performs the same test for NAV performance. The below-average NAV performance shows some degree of persistence (with a t-statistic of 1.61). The above-average NAV performance shows no persistence. This asymmetry of persistence is statistically significant. The stronger persistence of low premium and poor NAV performance relative to high premium and good NAV performance is consistent with the asymmetric AUM and fee adjustments that we have documented in prior sections.

For comparison, we also examine the persistence of CEF stock performance, calculated at the manager level, in Model (3). Because CEF shares are freely traded on exchanges, the efficient market hypothesis (weak-form) implies that stock performance should have no persistence. The result of Model (3) confirms this prediction, and indicates no evidence of

persistence in CEF stock performance.

Columns (4) to (7) present results for subsamples. They show that asymmetric persistence in NAV performance exists only among bond fund managers, which is consistent with our earlier findings indicating stronger entrenchment of these managers. Somewhat surprisingly, the asymmetry in the persistence of normalized premiums is more significant for equity fund managers than for bond fund managers, suggesting that negative perceptions about an equity fund manager are highly sticky.

6.2 Response of premiums to NAV performance and AUM growth

Finally, we examine the response of fund premiums to NAV performance and AUM growth. According to the Shareholder Surplus Hypothesis, good NAV performance, which leads to an upward revision of investor beliefs about manager skills, should have a stronger impact on the CEF premium than poor NAV performance has, because it is more likely to persist than poor NAV performance. If management has more power, however, then poor performance is more likely to persist, therefore fund premiums should respond more strongly to poor NAV performance. We now test these alternative predictions. We also conduct a further test of returns to scale in CEFs by investigating the effect of AUM growth on normalized fund premiums.

Figure 2 presents a graphical illustration of the relation between the change of normalized premiums and lagged NAV performance. Managers are sorted into quintiles based on their lagged one-year NAV performance, and the average change in premium for each quintile is plotted. The graph shows an interesting nonlinear pattern: the positive relation between premium changes and lagged NAV performance is steepest in the three middle performance quintiles. It is almost flat for the bottom quintile, and turns negative for the top quintile. This pattern, which we explore more formally next, is consistent with the Managerial Rent Hypothesis.

In Table 11, we regress the changes in normalized fund premiums during year t, calculated at the manager level, on the manager's NAV performance, AUM growth, and changes in expense ratio and liquidity gap during year $t-1$. To test the asymmetry of the response of

premium to performance, we adopt a piecewise-linear regression approach, and break lagged NAV performance into three intervals: high, medium, and low. The high and low intervals correspond to the top and bottom performance quintiles of the prior year, respectively. More specifically, we define $NavPerf_H$, $NavPerf_M$, and $NavPerf_L$ as follows:

$$\begin{aligned} NavPerf_L &= min(NavPerf,\ P20), \\ NavPerf_M &= min(P80 - P20,\ NavPerf - NavPerf_L), \\ NavPerf_H &= NavPerf - NavPerf_M - NavPerf_L, \end{aligned}$$

where P20 and P80 are the 20th and 80th percentile of $NavPerf$ in a given year, respectively. The coefficients of these three variables correspond to the slopes of $\Delta Premium$ in the three performance intervals. We control for lagged normalized premium to account for potential mean-reversion in premiums.

The results confirm the nonlinearity in the slope of $\Delta Premium$ with respect to lagged NAV performance illustrated in Figure 2. For the full sample (the first two columns), the slope is strongly positive in the middle performance range, insignificantly positive in the bottom quintile, and insignificantly negative in the top quintile. The positive coefficient on NAV performance in the middle range indicates that skilled managers cannot fully capture the rents they are expected to generate, nor can shareholders immediately force unskilled managers to reduce AUM or management fees. This is consistent with some frictions involved in adjusting the fees or the AUM of CEF managers. However, as performance becomes more extreme, the benefits from making adjustments outweigh their costs. Therefore, shareholders benefit from good performance only up to a limit, beyond which outperforming managers capture rents through fee increases and AUM expansions, as we have shown in Sections 3 and 4. Also, they are harmed by unskilled managers to a limit. When the underperformance becomes too severe, the manager will be fired, as we also showed in Section 3. This limits the adverse effects of unskilled managers on shareholders, which explains the lower slope of premium changes in the bottom performance quintile.

The subsample results presented in columns (3) through (6) show an interesting difference between equity and bond fund managers. While the response of premium to mid-range performance is the same in both samples, the response to bottom performance is strikingly different: it is insignificantly negative for equity fund managers, and significantly positive for bond fund managers. This is evidence that investors expect bottom performance to be more persistent in bond funds than in equity funds, consistent with our earlier findings suggesting that bond fund managers are more entrenched and that their poor performance is more persistent.

The effect of changes in expense ratios on premium is insignificant, potentially because such changes are endogenous, as we show in Section 4. In contrast, the effect of an increase in asset size, measured by either the continuous asset growth rate, or by the dummy variables indicating a discrete jump of AUM by more than 50%, is significantly negative for all samples. And its economic magnitude is large. For example, Model (2) shows that an AUM expansion of more than 50%, on average, is followed by a decrease of normalized fund premiums by 0.179. For domestic equity funds, the time-series average of the cross-sectional standard deviation of premiums is 12.93%. A drop of 0.179 in normalized premium translates into an increase of the discount by 2.31 percentage points. It suggests that the expected shareholder surplus per unit of NAV is reduced when a manager is given more assets to manage. This is consistent with decreasing returns to scale, and with the notion that AUM expansion represents a transfer of rents from shareholders to managers. Interestingly, the positive impact of AUM contraction is close to zero, suggesting that reductions in AUM are ineffective in improving expected future performance.

To summarize, the dynamics of fund premiums and NAV performance provide further support for the Managerial Rent Hypothesis, especially for the bond funds. They also provide further evidence for decreasing returns to scale in CEF management.

7 Conclusion

Two prominent phenomena of the mutual fund industry have long puzzled finance academics. One is the overwhelming predominance of OEFs in comparison to CEFs. Another is the widespread presence of CEF discounts. In this paper we argue that these two phenomena are related and provide new insights by investigating the dynamics of AUM and management fees at the manager level, and their implications for fund performance and discounts.

We formulate two polar hypotheses about the governance and manager market power in the CEF industry. The Shareholder Surplus Hypothesis postulates that market frictions allow shareholders to extract rents generated by skilled managers, and that effective governance prevents unskilled managers from destroying shareholder value. The Managerial Rent Hypothesis postulates that market power allows skilled managers to capture the rents they generate, and that unskilled managers are entrenched due to weak governance.

Based on the records of a large sample of individual fund managers from 1985 to 2010, we find that managers with poor NAV performance are more likely to leave the industry, consistent with a certain degree of managerial discipline, but overall our results provide much stronger support for the Managerial Rent Hypothesis. In particular, we find that CEF managers capitalize on good past performance and favorable investor perceptions about their future performance, as reflected in fund premiums, through AUM expansions and fee increases. However, the penalties for poor past performance or unfavorable investor perceptions are either insignificant, or substantially mitigated by manager tenure. Long manager tenure is associated with poor performance and high discounts. Furthermore, NAV performance and fund premiums are more persistent when they are below average than when they are above. Greater board independence is associated with lower fees and expenses, but is not directly related to NAV performance or premiums. These findings suggest that CEF shareholders have little capacity to extract rents from skilled managers, and have difficulty in disciplining unskilled managers.

We recognize that there are many factors that may have contributed to the success of OEFs. For instance, OEFs, by their very nature, expand and contract without significant costs, which

works well for their use in 401(k) plans and IRAs. Nevertheless, our results suggest that weak shareholder power in CEFs may be an important reason why CEFs are rare compared to OEFs, and why they usually trade at a discount.

CEFs and OEFs are two extremes on the spectrum of organizational forms in delegated portfolio managements. Hedge funds and exchange traded funds (ETFs) fall in between. Hedge funds allow redemptions subject to lockup and notice period constraints, while ETFs allow redemptions by authorized participants. We believe that the analysis of the pros and cons of various organizational forms in asset management is a promising area for future research.

Appendix: Variable Definitions

This appendix details the construction of variables used in our analysis.

A.1 Fund-level variables

The fund-level variables in Table 1 are defined as follows:

TNA	=	Total net assets in million dollars at the year end, defined as total portfolio value minus debt and preferred equity.
Premium	=	$-$ Discount $= \frac{P_t - NAV_t}{NAV_t}$, where P_t is the price of the CEF stock and NAV_t is the per-share net asset value at the year end.
NAV return	=	annualized continuously compounded weekly CEF NAV returns with dividend reinvested, calculated for funds with at least 40 weekly return observations in a given year.
Stock return	=	annualized continuously compounded weekly CEF stock returns with dividend reinvested, calculated for funds with at least 40 weekly return observations in a given year.
Management fee	=	the ratio of annual fees paid to the investment adviser, co-adviser and sub-adviser (if any) to the average TNA.
Expense	=	the ratio of annual expenses to the average TNA.
Dividend rate	=	the ratio of dividends paid out in an entire year to the sum of annual dividends and NAV at the year-end.
Leverage	=	the ratio of preferred equity plus debt to total fund assets.
Liquidity gap	=	illiquidity of underlying assets $-$ illiquidity of CEF stocks. Illiquidity of is measured by the coefficient θ_i in the moving average model $R_{it} = \alpha_i + \epsilon_{it} + \theta_i \epsilon_{i,t-1}$, where R_{it} is either NAV or stock returns. We estimate this model fund by fund on an annual basis using weekly data.
Board Size	=	the total number of directors on the board.
Board Independence	=	the ratio of board members that are counted as independent.
N of Managers	=	the number of managers on the management team.
Fund Age	=	the number of years since fund inception.

A.2 Manager-level variables

Variables related to manager AUM (asset under magement) reflect the aggregate from CEFs simultaneously managed, which include

Number of Fund	=	number of CEFs a manager is simultaneously managing at the year end.
AUM	=	$\sum_{i=1}^{N} \frac{TNA_{i,t}}{M_{it}}$, where $TNA_{i,t}$ is the total net asset of fund i in a manager's fund portfolio at the year end; and M_{it} is the total number of managers in fund i, N is the total number of CEFs managed by the manager.
Log(AUM)	=	the natural logarithm of AUM.
Asset Growth	=	$\frac{AUM_t - \Sigma_i^N TNA_{i,t-1} R_{it}/M_{it}}{AUM_{t-1}} - 1$, where AUM_t and AUM_{t-1} are a manager's AUM at the end of year t and $t-1$, respectively; $TNA_{i,t-1}$ is the lagged TNA and and R_{it} is the realized year-t NAV return of the i-th fund in the manager's fund portfolio; and M_{it} is the total number of managers in fund i. This variable is winsorized at the 99th percentile, and equals zero when a manager departs from the CEF industry.
Dual	=	a dummy variable that equals 1 if a manager manages simultaneously CEFs and OEFs and zero otherwise.
Tenure	=	the number of years since a manager starts to manage a given fund.

The category-adjusted Log(AUM) and asset growth are the manager Log(AUM) and asset growth minus the contemporaneous means of all managers in the same fund category, respectively. For a small fraction (2.8%) of manager-year observations, a manager manages funds in more than one category. In such cases, we assign the manager to the category in which his AUM is largest. Family asset growth is the growth of CEF assets in the family a manager belongs to, net of realized NAV returns.

Other manager-level variables, including *Tenure*, *Fund Age*, *NAV performance*, *Stock Performance*, *Normalized Premium*, as well as *Category-Adjusted Dividend Rate, Leverage, Expense and Management Fee ratios, Liquidity Gap, Board Independence and Board Size*, are first calculated for each individual fund in a manager's year-end fund portfolio, and then aggregated to the manager level as weighted averages across funds. The weight of each fund is given by the inverse of the number of managers in its management team.[22] *Normalized Premium* and *NAV performance* at the fund level are calculated as:

Normalized Premium = $\frac{Prem_t - \overline{Prem_t}}{\sigma(Prem)}$, where $Prem_t$ and $\overline{Prem_t}$ are fund premium and the category mean of fund premium at the year end, respectively; and $\sigma(Prem)$ is the cross-sectional standard deviation of premiums within the fund category at the year end.

NAV Performance = $\frac{\frac{1}{N}\sum_{t=1}^{N}(R_t - \overline{R}_t)}{\sigma(R_t - \overline{R}_t)} * \sqrt{52}$, where R_t is weekly fund NAV return, $\overline{R}_t$ is the equally weighted weekly NAV return of all funds in the same category, N is the number of return observations in a given year.

Stock Performance is calculated in the same way as *NAV Performance*, using weekly stock returns instead of NAV returns.

[22] For *NAV performance*, *Stock Performance*, and *Normalized Premium*, the weight is zero if a fund is managed by a manager for less than 40 weeks in a given year.

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Table 1: Summary statistics of closed-end funds

This table presents the mean and standard deviation (in parentheses) of various fund characteristics at the fund-year level for the full sample and for each fund category. Our Lipper-Morningstar matched sample has a total of 679 funds from 1985 to 2010, including 83 domestic equity funds, 86 international equity funds, 180 taxable bond funds, and 330 municipal bond funds, with a maximum of 9,242 fund-year observations (leverage and board structure data are available for about half of the sample). Variable definitions are detailed in Appendix A.1.

	Dom. Equity	Int. Equity	Tax. Bond	Muni Bond	Total
TNA	374.516	203.486	290.948	217.463	251.744
	(529.994)	(263.515)	(308.969)	(230.162)	(307.456)
Discount	0.073	0.069	0.034	0.046	0.049
	(0.136)	(0.159)	(0.086)	(0.073)	(0.100)
NAV Return	0.068	0.064	0.060	0.054	0.058
	(0.254)	(0.361)	(0.197)	(0.117)	(0.202)
Stock Return	0.068	0.065	0.057	0.054	0.058
	(0.301)	(0.405)	(0.225)	(0.164)	(0.240)
Management Fee (in %)	0.939	1.007	0.727	0.748	0.796
	(0.753)	(0.296)	(0.317)	(0.226)	(0.365)
Expense Ratio (in %)	1.686	1.913	1.816	1.163	1.478
	(1.731)	(0.691)	(1.054)	(0.375)	(0.917)
Payout rate	0.070	0.054	0.084	0.055	0.064
	(0.056)	(0.084)	(0.036)	(0.017)	(0.044)
Leverage	0.096	0.018	0.194	0.298	0.223
	(0.127)	(0.069)	(0.149)	(0.140)	(0.167)
Fund Age	14.488	9.075	10.770	8.094	9.617
	(12.376)	(6.123)	(8.778)	(5.434)	(7.791)
Liquidity Gap	0.078	0.087	0.245	0.306	0.237
	(0.238)	(0.189)	(0.281)	(0.273)	(0.277)
Board Size	7.762	8.448	7.738	8.078	8.027
	(2.642)	(2.736)	(2.416)	(1.991)	(2.288)
Board Independence	0.744	0.737	0.788	0.801	0.783
	(0.116)	(0.109)	(0.112)	(0.095)	(0.106)
Number of Managers	1.751	1.705	1.960	1.575	1.708
	(0.924)	(0.927)	(0.964)	(0.932)	(0.952)

Table 2: Summary statistics of CEF managers

This table presents summary statistics at the manager-year level for a sample of 1137 closed-end fund managers, accounting for all funds simultaneously managed by the same manager. *Number of Funds Managed* is the total number of funds simultaneously managed by a manager. *AUM* is the total CEF assets managed by a manager. *Asset growth* and *Family Asset Growth* are, respectively, the annual AUM growth rates for a manager and for the fund family he belongs to, net of growth due to realized NAV returns. *Dual* is a dummy variable that equals 1 if a manager manages simultaneously both CEFs and OEFs. *Tenure*, *Fund Age*, *NAV performance*, *Stock Performance*, *Normalized Premium*, as well as *Category-Adjusted Dividend Rate, Leverage, Expense and Management Fee ratios, Liquidity Gap, Board Independence and Board Size*, are first measured at the fund level, and then averaged across all simultaneously-managed funds. Each fund is weighted by the inverse of the number of its managers. Variable definitions are detailed in Appendix A.2.

	Mean	SD	N
Number of Funds Managed	2.177	3.778	6962
AUM	324.177	629.032	6959
Log(AUM)	4.878	1.325	6959
Asset Growth	-0.103	0.565	6573
Family Asset Growth	0.040	0.415	6732
Dual	0.481	0.500	6962
Tenure	4.854	4.724	6962
Log(1+Tenure)	1.499	0.731	6962
Fund Age	10.959	8.944	6962
Log(1+Fund Age)	2.176	0.839	6962
NAV Performance	0.051	1.373	6192
Stock Performance	0.065	0.810	6192
Normalized Premium	0.004	0.943	6182
Category-Adjusted Log(AUM)	-0.000	1.240	6959
Category-Adjusted Asset Growth	0.000	0.554	6573
Category-Adjusted Family Asset Growth	-0.000	0.372	6732
Category-Adjusted Dividend Rate	0.001	0.044	6900
Category-Adjusted Leverage	0.004	0.120	3884
Category-Adjusted Expense (in %)	-0.024	0.973	6716
Category-Adjusted Management Fee (in %)	0.001	0.418	6649
Category-Adjusted Liquidity Gap	0.001	0.211	6572
Category-Adjusted Board Independence	-0.002	0.100	3530
Category-Adjusted Board Size	0.174	2.462	3525

Table 3: AUM and management fee changes: event counts

Panel A presents the number of AUM expansion, contraction, and manager departure events. An AUM expansion (contraction) is defined as an increase (decrease) of AUM by more than 50% in a given year, after adjusting for growth due to realized NAV return. Expansions and contractions are further classified according to the reasons for the AUM change. A non-retirement departure occurs when a manager departs from all CEFs he has managed before age 60, while a retirement is a departure at age 60 or above. Panel B presents the number of fee change events, as well as the average proportional and absolute fee changes for each event category. A fee change event occurs when the annual management fee ratio computed at the manager level increases or decreases by more than 10% of the lagged average fee ratio in the manager's fund category.

Panel A. AUM events

Expansion (increased by more than 50%)	337
Increased number of funds	239
Same number of funds, smaller manager team	51
Same number of funds and team size, bigger funds	44
Other	3
Contraction (decreased by more than 50%)	192
Decreased number of funds	103
Same number of funds, bigger manager team	75
Same number of funds and team size, smaller funds	11
Other	3
Manager departure	759
Non-retirement	708
retirement	51

Panel B. Management fee changes

	N	proportional change (in %)		absolute change (in bps)	
		mean	median	mean	median
Increase	499	44	19	34	15
Decrease	472	-40	-20	-35	-18

Table 4: AUM expansion, contraction, and manager departure

This table presents multilogit regression results on AUM expansion, contraction and manager departure. All variables are measured at the manager level, as described in Table 2. The dependent variable is 1 (expansion) if a manager's AUM (net of changes due to realized NAV return) increases by more than 50% in a given year, -1 (contraction) if the AUM decreases by more than 50%, -2 (non-retirement departure) if the manager departs from all CEFs before age 60, and 0 (base case) otherwise. *NavPerf* is the average NAV performance (measured by the information ratio) in the prior two years. *Premium*, *Premium(Category)*, and *AUM* are the normalized fund premium, the average premium within the fund category, and the category-adjusted log AUM at the end of year $t-1$, respectively. *Tenure* and *FundAge* are the logs of 1 plus manager tenure and fund age, respectively, at the end of year $t-1$, adjusted by contemporaneous sample means. *Dual* is a dummy variable that equals 1 if a manager manages simultaneously both CEFs and OEFs at the end of year $t-1$. All models are estimated with fixed year effects. Robust Z-statistics allowing for clustered errors at the manager level are in parentheses.

	(1)			(2)		
	-2 (Dep.)	-1 (Con.)	1 (Exp.)	-2 (Dep.)	-1 (Con.)	1 (Exp.)
NavPerf	-0.197***	-0.097	0.211***	-0.307***	-0.135	0.150
	(-3.65)	(-1.18)	(2.80)	(-3.79)	(-0.89)	(1.33)
NavPerf * Tenure				0.222***	0.018	0.108
				(2.64)	(0.11)	(0.65)
NavPerf * Dual				0.076	0.061	0.084
				(0.69)	(0.35)	(0.56)
Premium	-0.118**	0.048	0.346***	-0.174**	0.114	0.414***
	(-2.19)	(0.49)	(5.17)	(-2.04)	(0.77)	(4.23)
Premium * Tenure				0.086	-0.103	0.152
				(0.91)	(-0.63)	(1.27)
Premium * Dual				0.045	-0.089	-0.181
				(0.39)	(-0.46)	(-1.25)
Premium(Category)	-0.412	2.004	3.727*	-0.486	1.894	3.880*
	(-0.29)	(0.79)	(1.70)	(-0.34)	(0.75)	(1.77)
Tenure	0.029	-0.093	-0.710***	0.070	-0.091	-0.805***
	(0.27)	(-0.47)	(-3.72)	(0.64)	(-0.46)	(-3.99)
Dual	-0.302***	0.255	0.047	-0.291***	0.261	0.093
	(-2.84)	(1.34)	(0.28)	(-2.72)	(1.36)	(0.52)
AUM	-0.251***	0.227***	-0.172***	-0.256***	0.228***	-0.162**
	(-5.95)	(3.78)	(-2.70)	(-6.04)	(3.78)	(-2.53)
FundAge	-0.201**	-0.169	-0.399***	-0.205**	-0.166	-0.412***
	(-2.21)	(-1.24)	(-3.10)	(-2.25)	(-1.22)	(-3.22)
Constant	-1.844***	-3.596***	-2.747***	-1.874***	-3.607***	-2.751***
	(-9.18)	(-8.23)	(-8.80)	(-9.29)	(-8.21)	(-8.78)
Observations	4592			4592		
Pseudo R^2	0.067			0.069		

* $p < 0.1$, **$p < 0.05$, *** $p < 0.01$

Table 5: Growth rate of manager AUM

This table presents multilogit regression results on the growth rate of managers' AUM. All variables are measured at the manager level, as described in Table 2. The dependent variable, *AssetGrowth*, is the category-adjusted growth rate of assets managed by an individual manager (net of realized NAV return). *NavPerf* is the average NAV performance (measured by the information ratio) in the prior two years. *Premium* and *AUM* are the normalized fund premium and the category-adjusted log AUM at the end of year $t-1$, respectively. *HighN* and *HighP* are indicators equal 1 if *NavPerf* and *Premium* are higher than zero, respectively. *Tenure* and *FundAge* are the logs of 1 plus manager tenure and fund age, respectively, at the end of year $t-1$, adjusted by contemporaneous sample means. *Dual* is a dummy variable that equals 1 if a manager manages simultaneously both CEFs and OEFs at the end of year $t-1$. The models are estimated with fixed effects of both managers and years. The t-statistics in parentheses are based on heteroscedasticity-consistent standard errors.

	(1)	(2)	(3)	(4)
	All	All	Equity	Bond
	AssetGrowth	AssetGrowth	AssetGrowth	AssetGrowth
NavPerf	0.045***	0.040**	0.054*	0.025
	(5.10)	(2.15)	(1.75)	(1.04)
NavPerf * HighN		0.022	-0.080*	0.083**
		(0.82)	(-1.74)	(2.53)
NavPerf * Tenure		-0.005	0.044*	-0.012
		(-0.31)	(1.77)	(-0.62)
NavPerf * Dual		-0.007	0.034	-0.018
		(-0.44)	(1.01)	(-0.96)
Premium	0.022*	-0.024	-0.095**	-0.001
	(1.88)	(-0.83)	(-2.00)	(-0.03)
Premium * HighP		0.077**	0.113**	0.095**
		(2.28)	(1.97)	(2.15)
Premium * Tenure		-0.005	0.001	0.007
		(-0.24)	(0.03)	(0.23)
Premium * Dual		-0.007	-0.023	-0.023
		(-0.30)	(-0.63)	(-0.73)
Tenure	-0.032	-0.032	-0.169*	0.019
	(-0.53)	(-0.53)	(-1.72)	(0.25)
AUM	-0.185***	-0.183***	-0.200***	-0.197***
	(-7.52)	(-7.43)	(-4.86)	(-6.06)
FundAge	-0.127*	-0.126	-0.133	-0.135
	(-1.65)	(-1.62)	(-1.35)	(-1.26)
Dual	0.119***	0.122***	0.115*	0.124***
	(3.54)	(3.66)	(1.83)	(3.07)
Constant	0.044	0.010	-0.006	-0.517***
	(0.60)	(0.13)	(-0.02)	(-4.27)
Observations	4639	4639	1836	2803
Adjusted R^2	0.098	0.099	0.083	0.120

* $p < 0.1$, **$p < 0.05$, *** $p < 0.01$

Table 6: Management fee changes

This table presents multilogit regression results on changes of management fees. All variables are measured at the manager level, as described in Table 2. The dependent variable is 1 (-1) if the management fee ratio increases (decreases) by more than 10% of the lagged category mean, and zero otherwise (base case). *NavPerf* is the average NAV performance (measured by the information ratio) in the prior two years. *Premium* and *Premium(Category)* are the lagged normalized premium and lagged category mean of premium, respectively. *AssetGrowth*, *AssetGrowth(Family)*, and *ManageFee* are, respectively, lagged category-adjusted manager and family asset growth (both net of realized NAV returns) and management fee ratio. *Tenure* and *FundAge* are the logs of 1 plus manager tenure and fund age, respectively, at the end of year $t-1$, adjusted by contemporaneous sample means. *Dual* is a dummy variable that equals 1 if a manager manages simultaneously both CEFs and OEFs at the end of year $t-1$. All models are estimated with fixed year effects. Robust Z-statistics allowing for clustered errors at the manager level are in parentheses.

	(1)		(2)	
	-1 (Decrease)	1 (Increase)	-1 (Decrease)	1 (Increase)
NavPerf	-0.012	0.207***	-0.013	0.257**
	(-0.20)	(2.91)	(-0.14)	(2.01)
NavPerf * Tenure			0.184	0.142
			(1.60)	(1.08)
NavPerf * Dual			-0.074	-0.171
			(-0.59)	(-1.12)
Premium	-0.049	0.140**	-0.040	0.176*
	(-0.70)	(2.14)	(-0.39)	(1.77)
Premium * Tenure			-0.106	-0.099
			(-0.98)	(-0.84)
Premium * Dual			0.036	-0.014
			(0.24)	(-0.12)
Premium(Category)	-3.324**	3.208**	-3.450**	3.110*
	(-1.97)	(2.04)	(-2.06)	(1.93)
AssetGrowth	0.140	0.031	0.138	0.022
	(1.13)	(0.27)	(1.11)	(0.19)
AssetGrowth(Family)	0.142	0.245	0.137	0.252
	(0.96)	(1.36)	(0.93)	(1.39)
Tenure	0.016	-0.096	0.004	-0.117
	(0.11)	(-0.56)	(0.03)	(-0.67)
Dual	-0.181	-0.268*	-0.175	-0.218
	(-1.26)	(-1.67)	(-1.22)	(-1.33)
FundAge	-0.140	-0.317**	-0.137	-0.317**
	(-0.97)	(-2.25)	(-0.94)	(-2.24)
ManageFee	2.117***	-0.351	2.103***	-0.328
	(5.40)	(-1.22)	(5.27)	(-1.17)
Constant	-3.033***	-4.043***	-3.046***	-4.068***
	(-8.60)	(-6.79)	(-8.69)	(-6.78)
Observations	3961		3961	
Pseudo R^2	0.086		0.088	

* $p < 0.1$, **$p < 0.05$, *** $p < 0.01$

Table 7: Determinants of NAV performance

This table presents the regression results on NAV performance (*NavPerf*), measured by the information ratio on an annual basis. All variables are measured at the manager level, as described in Table 2. *Premium* and *AUM* are the normalized fund premium and the category-adjusted log AUM at the end of year $t-1$, respectively. AUM(OEF) is the log of AUM in open-end funds adjusted by the category mean in year $t-1$ (for dual managers only). *Expense* and *Leverage* are, respectively, the category-adjusted expense ratio and leverage ratio in year $t-1$. *Tenure* and *FundAge* are, respectively, the logs of 1 plus manager tenure and fund age at the end of year $t-1$, adjusted by contemporaneous sample means. *Long* is a dummy variable equal to 1 if *Tenure* is positive (i.e., above the contemporaneous sample mean), and zero otherwise. *Dual* is a dummy variable that equals 1 if a manager manages simultaneously both CEFs and OEFs at the end of year $t-1$. Separate models are presented for all managers, for "dual managers" of both CEFs and OEFs, for equity CEF managers, and for bond CEF managers. The models are estimated with manager fixed effects. The t-statistics in parentheses are based on heteroscedasticity-consistent standard errors.

	(1) All NavPerf	(2) Dual NavPerf	(3) All NavPerf	(4) All NavPerf	(5) Equity NavPerf	(6) Bond NavPerf
Tenure	-0.257***	-0.209**	-0.033	-0.002	-0.071	0.013
	(-4.81)	(-2.51)	(-0.32)	(-0.02)	(-0.35)	(0.08)
Tenure * Long			-0.514***	-0.469**	-0.332	-0.550*
			(-3.08)	(-2.21)	(-1.07)	(-1.90)
Tenure * Premium			0.145***	0.187***	0.269***	0.134
			(3.41)	(3.05)	(3.22)	(1.52)
Premium			-0.041	0.018	-0.132**	0.102*
			(-1.30)	(0.40)	(-2.03)	(1.68)
AUM	-0.238***	-0.246***	-0.238***	-0.285***	-0.415***	-0.260***
	(-6.43)	(-4.60)	(-5.66)	(-4.68)	(-3.51)	(-3.81)
AUM(OEF)		-0.062**				
		(-2.17)				
Expense	-0.028	-0.075**	-0.036	-0.097	0.027	-0.304***
	(-1.06)	(-2.08)	(-1.35)	(-1.33)	(0.44)	(-2.88)
FundAge	0.153*	0.060	0.149	0.179	0.174	0.187
	(1.84)	(0.52)	(1.40)	(1.06)	(0.55)	(0.91)
Dual	0.213***		0.161*	0.307**	-0.077	0.363**
	(2.66)		(1.81)	(2.33)	(-0.36)	(2.38)
Leverage				1.486***	1.664	1.803***
				(2.77)	(1.41)	(2.84)
Constant	-0.041	0.145***	0.152**	0.089	0.351***	0.042
	(-1.02)	(11.19)	(2.36)	(0.89)	(2.84)	(0.30)
Observations	5768	2876	5050	2990	1070	1920
Adjusted R^2	0.014	0.016	0.017	0.024	0.036	0.028

* $p < 0.1$, **$p < 0.05$, *** $p < 0.01$

Table 8: Determinants of premiums

This table presents regression results on normalized fund premiums. All variables are measured at the manager level, as described in the legend of Table 2. *NavPerf* is the average NAV performance in years $t-1$ and $t-2$. AUM is the category-adjusted log AUM at the end of year $t-1$. *Expense*, *DividendRate*, and *Leverage* are the category-adjusted expense ratio, dividend rate, and leverage ratio in year $t-1$. *Tenure* and *FundAge* are, respectively, the logs of 1 plus manager tenure and fund age at the end of year $t-1$, adjusted by contemporaneous sample means. *Long* is a dummy variable equal to 1 if *Tenure* is positive (i.e., above the contemporaneous sample mean), and zero otherwise. *Dual* is a dummy variable that equals 1 if a manager manages simultaneously both CEFs and OEFs at the end of year $t-1$. *LiquidityGap* is the category-adjusted difference between the measures of illiquidity for the CEF assets and stocks in year $t-1$. The models are estimated with manager fixed effects. The t-statistics in parentheses are based on heteroscedasticity-consistent standard errors.

	(1) All Premium	(2) All Premium	(3) Equity Premium	(4) Equity Premium	(5) Bond Premium	(6) Bond Premium
NavPerf	0.046**	-0.005	0.074*	0.043	0.048**	0.005
	(2.42)	(-0.22)	(1.69)	(0.73)	(2.41)	(0.19)
Tenure	0.050	0.164	0.129	0.255	-0.014	0.111
	(0.41)	(1.15)	(0.71)	(1.11)	(-0.08)	(0.67)
Tenure * Long	-0.271*	-0.410**	-0.323	-0.698**	-0.164	-0.160
	(-1.74)	(-2.29)	(-1.31)	(-2.30)	(-0.83)	(-0.77)
AUM	-0.118***	-0.155***	-0.099*	-0.034	-0.112**	-0.164**
	(-2.79)	(-2.63)	(-1.72)	(-0.38)	(-2.14)	(-2.52)
DividendRate	1.462***	1.544***	1.103**	0.903*	4.639**	7.966***
	(3.32)	(2.73)	(2.57)	(1.76)	(2.59)	(3.17)
Expense	0.017	0.020	0.036	0.047	-0.013	-0.031
	(0.52)	(0.48)	(0.83)	(1.23)	(-0.30)	(-0.49)
FundAge	0.416***	0.306**	0.230	0.442*	0.476***	0.232
	(3.59)	(2.13)	(1.20)	(1.81)	(3.28)	(1.34)
Dual	0.061	0.012	0.039	0.185	0.069	-0.017
	(0.98)	(0.16)	(0.25)	(1.45)	(1.08)	(-0.23)
LiquidityGap	0.048	-0.072	-0.098	-0.116	0.144*	0.028
	(0.65)	(-0.72)	(-0.73)	(-0.60)	(1.65)	(0.24)
Leverage		0.711**		1.126		0.595
		(1.97)		(1.55)		(1.56)
Constant	0.027	0.113**	0.084	0.050	-0.023	0.071
	(0.62)	(2.25)	(1.10)	(0.49)	(-0.44)	(1.18)
Observations	4171	2570	1635	902	2536	1668
Adjusted R^2	0.025	0.027	0.017	0.032	0.034	0.048

* $p < 0.1$, **$p < 0.05$, *** $p < 0.01$

Table 9: The effects of board structure

We investigate whether board structure is related to NAV performance, normalized fund premium, and category-adjusted management fee and expense ratios. All variables are measured at the manager level, as described in Table 2. Board size is measured by the total number of directors. Independence is measured by the proportion of independent directors on the board. Both measures are calculated as the deviation from the contemporaneous category mean. *AUM*, *Expense*, *DividendRate*, and *Leverage* are the category-adjusted log AUM, expense ratio, dividend rate, and leverage ratio. *Tenure* and *FundAge* are, respectively, the logs of 1 plus manager tenure and fund age adjusted by contemporaneous sample means. *Dual* is a dummy variable that equals 1 if a manager manages simultaneously both CEFs and OEFs. *LiquidityGap* is the category-adjusted difference between the measures of illiquidity for the CEF assets and stocks. All independent variables are lagged by one year. The models are estimated with manager fixed effects. The t-statistics in parentheses are based on heteroscedasticity-consistent standard errors.

	(1)	(2)	(3)	(4)	(5)	(6)
	NavPerf	NavPerf	Premium	Premium	ManageFee	Expense
Independence	-0.398	-0.690	-0.560	-0.711	-0.343***	-0.657***
	(-0.57)	(-0.95)	(-0.99)	(-1.23)	(-2.74)	(-2.88)
BoardSize	-0.052	-0.046	0.022	0.027	0.000	-0.021
	(-1.33)	(-1.14)	(0.99)	(1.16)	(0.05)	(-1.11)
Tenure*Independence		0.635		0.875		
		(0.90)		(1.31)		
Tenure*BoardSize		-0.043		0.018		
		(-1.32)		(0.74)		
Tenure	-0.252***	-0.239**	-0.191**	-0.195**	-0.041***	-0.021
	(-2.59)	(-2.52)	(-2.45)	(-2.44)	(-2.82)	(-0.77)
AUM	-0.363***	-0.371***	-0.159***	-0.163***	0.002	-0.025
	(-4.43)	(-4.51)	(-2.64)	(-2.65)	(0.16)	(-1.23)
Expense	-0.055	-0.058	-0.003	-0.003		
	(-0.76)	(-0.80)	(-0.07)	(-0.07)		
FundAge	0.176	0.176	0.388**	0.389**	0.043	0.057
	(0.92)	(0.92)	(2.50)	(2.52)	(1.40)	(0.86)
Dual	0.257*	0.260*	-0.109	-0.097	0.017	-0.030
	(1.86)	(1.86)	(-1.53)	(-1.33)	(0.85)	(-0.88)
Leverage	1.358**	1.390**	0.469	0.435	0.267**	0.626**
	(2.20)	(2.25)	(1.35)	(1.27)	(2.35)	(2.26)
DividendRate			0.981**	0.934**		
			(2.29)	(2.24)		
LiquidityGap			0.079	0.077		
			(0.74)	(0.72)		
Constant	0.027	0.027	0.032	0.023	-0.030**	0.000
	(0.33)	(0.33)	(0.68)	(0.49)	(-2.32)	(0.02)
Observations	2352	2352	2336	2336	2253	2256
Adjusted R^2	0.020	0.020	0.028	0.031	0.015	0.011

* $p < 0.1$, **$p < 0.05$, *** $p < 0.01$

Table 10: Persistence of NAV performance and premium

This table presents the regression results for the persistence of NAV performance (*NavPerf*), stock performance (*StockPerf*), and normalized fund premium (*Premium*). Each variable is regressed on its own one-year lag, and an interaction term. All variables are measured at the manager level, as described in Table 2. $HighN_{t-1}$, $HighS_{t-1}$, and $HighP_{t-1}$ are dummy variables indicating, respectively, whether $NavPerf_{t-1}$, $StockPerf_{t-1}$, and $Premium_{t-1}$ are positive (i.e., above contemporaneous means of the fund category). The t-statistics are adjusted for error clustering at both year and manager levels.

	(1) All Premium	(2) All NavPerf	(3) All StockPerf	(4) Equity Premium	(5) Equity NavPerf	(6) Bond Premium	(7) Bond NavPerf
$Premium_{t-1}$	0.734***			0.843***		0.658***	
	(12.97)			(8.97)		(13.39)	
$Premium_{t-1}$ * $HighP_{t-1}$	-0.167**			-0.308**		-0.061	
	(-2.32)			(-2.39)		(-1.00)	
$NavPerf_{t-1}$		0.161			0.040		0.204*
		(1.61)			(0.41)		(1.77)
$NavPerf_{t-1}$ * $HighN_{t-1}$		-0.193*			0.129		-0.322**
		(-1.84)			(0.92)		(-2.46)
$StockPerf_{t-1}$			-0.015				
			(-0.22)				
$HighS_{t-1}$ * $StockPerf_{t-1}$			-0.005				
			(-0.06)				
Constant	0.065**	0.155***	0.072***	0.127***	0.017	0.018	0.219***
	(2.36)	(2.64)	(2.82)	(2.92)	(0.23)	(0.74)	(2.60)
Observations	5113	5127	5127	2028	2041	3085	3086
Adjusted R^2	0.404	0.007	-0.000	0.416	0.013	0.396	0.011

* $p < 0.1$, **$p < 0.05$, *** $p < 0.01$

Table 11: Changes of fund premiums

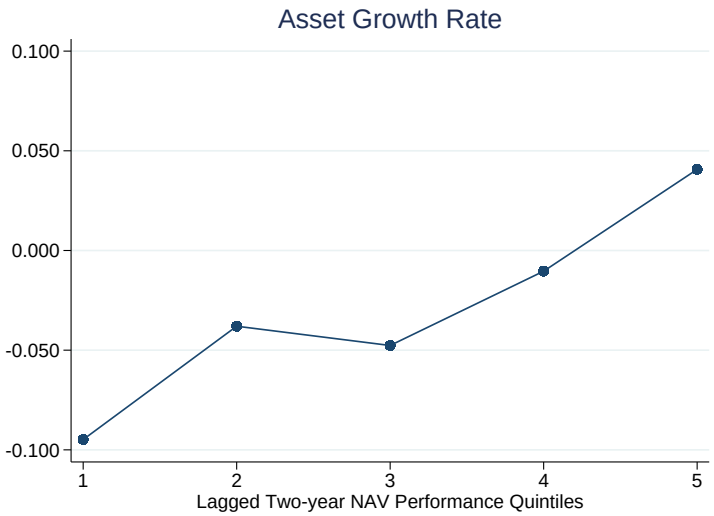
This table presents regression results for changes in fund premiums. The dependent variable, $\Delta Premium$, is the annual change in the normalized fund premium. All variables are measured at the manager level, as described in Table 2. *NavPerf* and *AssetGrowth* are, respectively, the NAV performance and the category-adjusted AUM growth rate (adjusted for realized NAV returns) in the prior year; *Expansion* is an indicator equal 1 if *AssetGrowth* is higher than 50% and zero otherwise, *Contraction* is an indicator equal 1 if *AssetGrowth* is below -50% and 0 otherwise; $\Delta LiqudityGap$ and $\Delta Expense$ are lagged changes in category-adjusted liquidity gap and expense ratios, respectively; *Premium* is the normalized premium at the end of the prior year; $NavPerf_H$, $NavPerf_M$, and $NavPerf_L$ are defined as follows:

$$\begin{aligned} NavPerf_L &= min(NavPerf,\ P20), \\ NavPerf_M &= min(P80 - P20,\ NavPerf - NavPerf_L), \\ NavPerf_H &= NavPerf - NavPerf_M - NavPerf_L, \end{aligned}$$

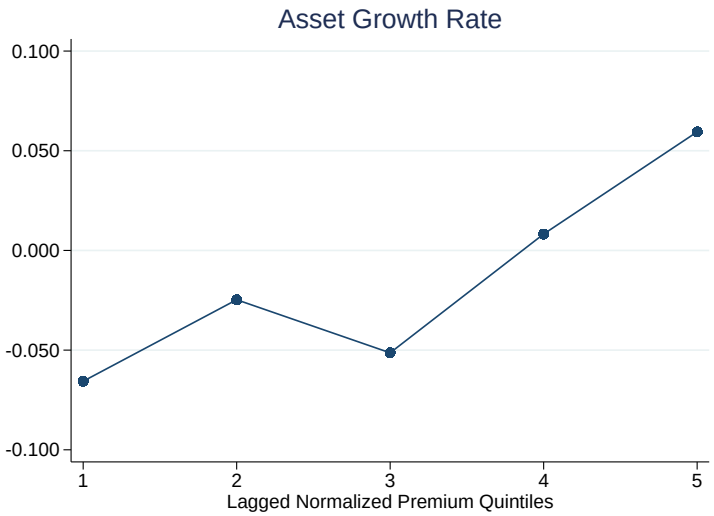
where P20 and P80 are the 20th and 80th percentile of $NavPerf$ in the prior year, respectively. The models are estimated with manager fixed effects. The t-statistics in parentheses are based on heteroscedasticity-consistent standard errors.

	(1)	(2)	(3)	(4)	(5)	(6)
	All	All	Equity	Equity	Bond	Bond
	ΔPremium	ΔPremium	ΔPremium	ΔPremium	ΔPremium	ΔPremium
NavPerf_H	-0.031	-0.028	0.020	0.020	-0.050	-0.046
	(-1.10)	(-0.98)	(0.41)	(0.40)	(-1.45)	(-1.35)
NavPerf_M	0.064***	0.064***	0.064***	0.065***	0.058***	0.059***
	(4.62)	(4.61)	(2.68)	(2.70)	(3.28)	(3.29)
NavPerf_L	0.029	0.028	-0.067	-0.069	0.064***	0.062***
	(1.33)	(1.28)	(-1.38)	(-1.42)	(2.66)	(2.61)
AssetGrowth	-0.084***		-0.156***		-0.063**	
	(-3.31)		(-3.51)		(-2.09)	
Expansion		-0.179***		-0.255***		-0.147**
		(-3.64)		(-3.19)		(-2.41)
Contraction		0.035		0.134		-0.015
		(0.54)		(1.22)		(-0.18)
Δ Expense	-0.005	-0.005	-0.002	-0.003	-0.023	-0.024
	(-0.31)	(-0.33)	(-0.12)	(-0.19)	(-0.60)	(-0.63)
Δ LiquidityGap	-0.064	-0.064	-0.007	-0.006	-0.112**	-0.111**
	(-1.55)	(-1.55)	(-0.09)	(-0.08)	(-2.23)	(-2.23)
Premium	-0.664***	-0.666***	-0.690***	-0.691***	-0.647***	-0.649***
	(-28.31)	(-28.41)	(-17.06)	(-17.14)	(-23.39)	(-23.49)
Constant	-0.016	-0.019	-0.104*	-0.118**	0.021	0.021
	(-0.53)	(-0.62)	(-1.85)	(-2.08)	(0.56)	(0.56)
Observations	4531	4531	1788	1788	2743	2743
Adjusted R^2	0.352	0.352	0.364	0.364	0.347	0.347

* $p < 0.1$, **$p < 0.05$, *** $p < 0.01$



(a) Asset growth rate and lagged NAV performance



(b) Asset growth rate and lagged premium

Figure 1: **Asset growth rate and lagged NAV performance/premium.** Each year, managers are sorted into five quintiles based on their average NAV performance in the prior two years (Panel (a)), or the normalized category-adjusted fund premium at the prior year end (Panel (b)). The figures show the average category-adjusted asset growth rate across manager-years in each quintile.

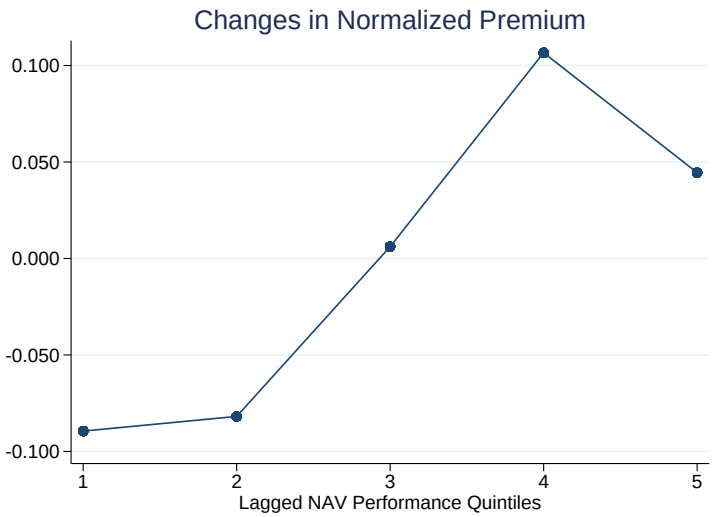


Figure 2: **Premium changes and lagged NAV performance.** Each year, managers are sorted into five quintiles based on their NAV performance in the prior year. The figure shows the average change of the normalized category-adjusted premium across manager-years in each quintile.

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