Portfolio Manager Compensation in the U.S. Mutual Fund Industry*

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Abstract

Using a hand-collected data set of over 5,000 mutual funds, we study the compensation structures of individual portfolio managers in the U.S. mutual fund industry. About three-quarters of portfolio managers receive performance-linked bonuses from investment advisors. Managers with performance-linked bonuses exhibit superior subsequent fund performance, especially when advisors link pay to performance over a longer time period. In contrast, alternative compensation arrangements, such as fixed salary, assets-based pay, or advisor-profits-based pay are not associated with superior performance. Overall, our study documents novel empirical evidence on the impact of individual portfolio manager compensation on mutual fund performance.

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1. Introduction

Mutual funds are professionally managed investment vehicles that pool money from many investors to purchase securities such as stocks, bonds, and money market instruments. About half of all households in the United States invest in mutual funds, and the assets managed by them totaled $15 trillion at year-end 2013.[1] Given the importance of mutual funds in the economy, understanding fund managers' incentives is a key issue for academics, regulators, practitioners, and individual investors. Due to lack of data on individual fund manager incentives, the literature has focused primarily on the design of the advisory contracts between fund investors and investment advisors (i.e., asset management companies), and its implications for fund performance.[2] Little is known about the layer of incentives that may more directly impact fund performance, that is, the compensation contracts of actual decision makers—individual portfolio managers hired by advisors to manage the portfolio on a daily basis.

In March 2005, the U.S. Securities and Exchange Commission (SEC) adopted a new rule requiring mutual funds to disclose the compensation structure of their portfolio managers in the Statement of Additional Information (SAI).[3] For instance, mutual funds need to disclose whether portfolio manager compensation is fixed or variable, and whether compensation is based on the fund's investment performance and/or assets under management (AUM). For performance-based compensation, funds are required to identify any benchmark used to measure performance and to state the length of the period over which performance is measured. We analyze this mandatorily

[1] See the Investment Company Institute 2014 Fact Book: http://www.ici.org/pdf/2014_factbook.pdf.
[2] See, e.g., Starks (1987), Golec (1992), Coles, Suay, and Woodbury (2000), Deli (2002), Elton, Gruber, and Blake (2003), Golec and Starks (2004), Dass, Massa, and Patgiri (2008), Massa and Patgiri (2009), and Warner and Wu (2011).
[3] See SEC Rule S7-12-04, Disclosure Regarding Portfolio Managers of Registered Management Investment Companies, http://www.sec.gov/rules/final/33-8458.htm.

disclosed information in this paper to enhance our understanding of managerial incentives, and their effectiveness, in the mutual fund industry.

We hand-collect the information on portfolio manager compensation structures from the SAIs of a sample of 5,040 U.S. open-end mutual funds over the period 2006–2011. We uncover the following stylized facts. First, unlike the formulistic AUM-based advisory contract (see, e.g., Coles, Suay, and Woodbury, 2000); Deli, 2002; Massa and Patgiri, 2009), individual portfolio manager compensation is not formula-based. Second, 96.8% of sample funds report that their portfolio managers receive variable bonus-type compensation as opposed to fixed salary. Third, the bonus component of compensation is explicitly tied to the fund's investment performance for more than three-quarters of sample funds. The performance evaluation window ranges from 1 quarter to 10 years, and the average evaluation window is 3 years. Finally, we find that for about half the sample, the manager's bonus is directly linked to the overall profitability of the advisor. Only 19.2% of sample funds explicitly mention that the advisor considers the fund's AUM when deciding manager bonuses.[4] These stylized facts contrast with the evidence on advisory contracts, in which AUM-based advisory fees are the predominant structure, and performance-based compensation is rarely observed (e.g., Elton, Gruber, and Blake, 2003).

We next examine the effectiveness of the incentives arising from portfolio managers' compensation contracts. We begin our analysis by examining the impact of performance-based compensation on mutual fund performance. We hypothesize that explicit performance-based pay is associated with superior fund performance. There are two alternative, but not mutually exclusive, explanations for this hypothesis. First, as predicted by agency theory, performance-based contracts induce greater effort by the manager (e.g., Holmstrom, 1979; Prendergast, 1999). Alternatively, skilled managers gravitate toward funds with performance-based compensation structures, since they

[4] Note that performance-based, AUM-based, and advisor-profits-based pay structures are not necessarily mutually exclusive in portfolio manager compensation.

expect to earn more by managing this type of fund. In either case, we expect that funds with performance-based portfolio manager compensation exhibit better performance compared to funds without this characteristic.

To test this empirical prediction, we relate portfolio manager compensation structures to subsequent fund performance. Our comprehensive sample consists of actively managed U.S. equity, bond, balanced, and global funds. We employ two measures of fund risk-adjusted performance: (i) benchmark-adjusted alpha, computed by regressing the fund's monthly excess returns (net return minus 1-month T-bill rate) on the excess returns of the Morningstar benchmark of the fund; and (ii) six-factor alpha, estimated using the Carhart (1997) four-factor model augmented with a bond factor and an international factor (e.g., Elton, Gruber, and Blake, 2007). In our regression analysis, we control for advisory contract incentives (Elton, Gruber, and Blake, 2003; Massa and Patgiri, 2009) and various other advisor, fund, and manager characteristics.

Consistent with the hypothesis, we find that managers with performance-based pay subsequently outperform managers without such incentive by 43.3 basis points per annum, as measured by benchmark-adjusted alpha, and 57.7 basis points per annum as measured by six-factor alpha. This outperformance is both statistically and economically significant. In contrast, we do not find that alternative compensation arrangements, such as fixed salary, AUM-based, or advisor-profits-based compensation are associated with superior performance. When we carry out a "horse race" among various compensation structures, funds with performance-based portfolio manager pay outrun funds with fixed salary, AUM-based pay, and advisor-profits-based pay by 59.8 (70.6), 67.2 (74.4), and 36.6 (69.5) basis points per annum, as measured by benchmark-adjusted (six-factor) alpha, respectively. The performance difference among managers with fixed salary, AUM-based, and advisor-profits-based pay is not significantly different from zero.

As required by the SEC, if portfolio manager compensation is directly linked to fund performance, the fund is required to disclose the length of the period over which performance is measured, which we refer to as the "evaluation period." Short evaluation periods may damage fund performance, because they induce managers to engage in such activities as excess risk-taking and window dressing to boost short-term performance. Longer evaluation periods can mitigate the problem of "short-termism" and help identify and reward managerial skill rather than luck. However, too long an evaluation period can protect managers from dismissal in the short-run and induce self-serving behavior such as shirking and herding, which can be detrimental to fund performance. Therefore, it is an empirical issue as to whether and how evaluation period impacts fund performance.

Our empirical analysis shows a positive linear relation between evaluation period and fund risk-adjusted performance for managers receiving performance-based pay. For instance, when we sort funds into three groups based on evaluation period, the bottom (i.e., shortest evaluation periods), middle, and top groups (i.e., longest evaluation periods) exhibit benchmark-adjusted alpha of 0.31%, 0.48%, and 0.80% per annum, respectively. Moreover, when we focus on the subsample of funds that provide a clear performance benchmark in their SAIs as required by the SEC, the effect of evaluation period on fund performance amplifies, with the magnitude almost doubling. The positive relation between evaluation period and fund performance remains statistically and economically significant after controlling for various advisor, fund, and manager characteristics. Based on our regression estimates, a one-standard-deviation (i.e., 1.2 years) increase in evaluation period is associated with a 35.4 (27.1) basis point improvement in annualized benchmark-adjusted (six-factor) alpha.

Next, we study the effects of portfolio manager compensation structures on fund risk-taking. We find that managers who receive bonus pay take significantly more risk compared to those who receive only a fixed salary, which is consistent with the idea that contracts with convex payoffs can increase risk-taking incentives (e.g., Grinblatt and Titman, 1989). In particular, funds with portfolio

managers who receive bonus pay exhibit significantly greater return volatility and systematic risk (i.e., loading on the benchmark). However, we find no significant difference across the three bonus structures (i.e., performance, AUM, and advisor-profits-based pay). For the subsample of domestic equity funds, we analyze their stock holdings and find some evidence that managers with only a fixed salary engage less in half-year risk-shifting behavior (e.g., Brown, Harlow, and Starks, 1996; Chevalier and Ellison, 1997). Finally, managers with longer evaluation periods are associated with lower half-year risk-shifting than managers with shorter evaluation periods, conditional on receiving performance-based pay.

Our last test analyzes the cross-sectional variations in the compensation structures of portfolio managers. We find that some of the variations are related to advisor, fund, and manager characteristics. First, larger investment advisors use fixed salaries less often and performance-based incentives more frequently than smaller advisors. In addition, larger advisors tend to use a longer evaluation window than smaller advisors when linking pay to investment performance. This evidence is consistent with the idea that larger advisors face greater costs when monitoring individual managerial effort, and thus link manager pay directly to output (i.e., fund performance) over a longer horizon. Second, managers with a controlling stake in the advisory firm receive more advisor-profits-based and less performance-based compensation, which suggests that alternative incentive mechanisms, such as managerial ownership (Jensen and Meckling, 1976), reduce the use of explicit performance-based compensation. Third, investment advisors are more likely to link portfolio manager compensation to AUM for funds that attract lower capital flows. Finally, conditional on advisors granting performance-based pay, the evaluation period is longer for younger funds and funds with lower portfolio turnover rate.

Taken together, our evidence indicates that performance-based pay in portfolio manager compensation, especially when pay is linked to performance over longer time periods, is associated

with superior future fund performance, either by inducing greater managerial effort or by attracting more skilled managers, or both. Moreover, compensation structures of portfolio managers have implications for fund risk-taking. Overall, these findings suggest that mandatory disclosure on portfolio manager compensation can be of great value to investors in assessing managerial incentives and predicting future fund performance.

Our paper contributes to the vast literature on managerial incentives in the U.S. mutual fund industry. To the best of our knowledge, this paper is the first to empirically study individual portfolio manager compensation based on SEC mandatory disclosures.[5] The literature has thus far focused on advisory contracts between fund shareholders and investment advisors (see footnote 2). Our paper shifts the focus to within the investment advisors and examines the compensation structures of individual portfolio managers, an area overlooked but critical in understanding managerial incentives in the mutual fund industry. We uncover several distinct patterns of portfolio manager compensation contracts that sharply contrast with the patterns documented for advisory contracts (e.g., Elton, Gruber, and Blake, 2003).

Our main contribution is that, as predicted by theory (Das and Sundaram, 2002; Li and Tiwari, 2009), explicit, option-type performance-based incentive contracts *exist* and *work* in the U.S. mutual fund industry. Our evidence provides new insight into the issue of managerial incentives in the mutual fund industry. On the one hand, the literature finds that explicit performance-based incentives rarely exist in advisory contracts (e.g., Elton, Gruber, and Blake, 2003; Golec and Starks, 2004). On the other hand, there is an extensive literature that studies the implicit incentives embedded in the convex relationship between fund flows and performance (e.g., Brown, Harlow, and Starks, 1996; Chevalier and Ellison, 1997; Sirri and Tufano, 1998; Basak, Pavlova, and Shapiro,

[5] Farnsworth and Taylor (2006) use survey data from 396 portfolio managers to analyze the determinants of portfolio manager compensation structures. Given the nature of the data, their study is subject to self-reporting bias and sample selection bias.

2007, 2008; Huang, Wei, and Yan, 2007).[6] These two pieces of evidence appear to indicate that the U.S. mutual fund industry relies mainly on implicit incentives to induce managerial effort. In contrast to this view, our study documents that explicit performance-based incentive contracts exist and predominate. More importantly, these explicit performance-based incentives are associated with superior fund performance, which echoes the evidence in Agarwal, Daniel, and Naik (2009) on managerial incentives in the hedge fund industry, and Elton, Gruber and Blake (2003) on performance-based advisory fee contracts. Finally, our empirical evidence provides guidance for theoretical models on portfolio delegation in the asset management industry (e.g., Basak and Pavlova, 2013).

The remainder of this paper proceeds as follows. Section 2 discusses the institutional background. Section 3 presents the data, variable construction, and sample description. Section 4 examines the effects of portfolio manager compensation on fund performance. Section 5 studies the effects of portfolio manager compensation on fund risk-taking. Section 6 analyzes the cross-sectional determinants of portfolio manager compensation structures. Finally, Section 7 sets forth our conclusions.

2. Institutional background

Mandated by the Investment Company Act of 1940, mutual funds have a distinctive organizational structure. A typical mutual fund consists of fund shareholders and a board of directors. Shareholders, who are the owners of the funds, have specific voting rights to elect a board of directors that represents their interests. The board of directors is legally empowered to govern the fund. Its primary responsibility is to review and approve the advisory contract with an investment advisor (i.e., the asset management company) for the fund's management. Portfolio managers, who

[6] See Spiegel and Zhang (2013) for evidence that challenges the convex flow–performance relationship.

are employees of the investment advisor, make the day-to-day investment decisions for the fund. Selection, compensation, and removal of portfolio managers occur at the advisor's discretion.

Investment advisors receive compensation through advisory fees for providing portfolio management services to fund shareholders. In most cases, the advisory fee is specified as a percentage of the fund's total net assets (e.g., Elton, Gruber, and Blake, 2003; Golec and Starks, 2004). Only a small proportion (less than 5%) of mutual funds compensates their investment advisors using incentive fees that are based on fund investment performance relative to a pre-specified benchmark. The advisory contract between fund shareholders and the investment advisor is constrained by regulation, which prohibits asymmetric incentive fees. According to section 205 (a) (1) of the Investment Advisers Act of 1940, the incentive fees received by an investment advisor must be symmetric relative to the benchmark, with any increase in fees for above-benchmark performance matched by a symmetric decrease in fees for below-benchmark performance. In contrast, the compensation contract between the investment advisor and portfolio managers, which we examine in this study, is not subject to this regulatory restriction.[7]

While the advisory contract between fund shareholders and the investment advisor has been disclosed to the investors for decades (e.g., via the SEC N-SAR Form), little is known about the compensation contract between investment advisors and portfolio managers. Since March 2005, the SEC has required mutual funds to disclose in their SAIs the structure of their portfolio managers' compensation and the method used to determine it. This new disclosure requirement is part of a series of regulations the SEC introduced in 2004 to improve the transparency of the mutual fund industry and to help investors better understand a portfolio manager's incentives in managing a fund.

[7] In an SEC memorandum enclosed with Congressional Correspondence on Mutual Funds and Derivative Instruments dated September 26, 1994, footnote 35 states that "the Investment Advisors of 1940 prohibits most types of performance fees for registered investment advisers, but this prohibition does not apply to the compensation arrangements that investment advisers have with their employees, including mutual fund portfolio managers."

Per the disclosure requirement, portfolio manager compensation includes, without limitation, salary, bonus, deferred compensation, and whether the compensation is cash or non-cash. For each type of compensation, a fund is required to specifically describe the criteria on which such compensation is based: for example, whether the compensation is fixed, whether (and how) compensation is based on the fund's pre- or after-tax performance over a certain period, and whether (and how) compensation is based on the value of assets held in the fund's portfolio. In the case of a performance-based bonus, a fund is required to identify any benchmark used to measure performance and state the length of the period over which performance is measured. It is important to note that mutual funds are required to disclose only the criteria upon which compensation is based, and not the dollar value of compensation received by portfolio managers.

3. Data, variables, and sample overview

3.1. Data

We construct our sample from several data sources. Our first data source is the Morningstar Direct Mutual Fund database, which covers U.S. open-end mutual funds and includes information about fund names, fund returns, AUM, inception dates, expense ratios, turnover ratios, investment objectives, fund tickers, benchmark portfolios, manager names, advisor names, and other fund characteristics.

Our sample covers diversified domestic equity funds, bond funds, balanced funds, global funds, and funds in miscellaneous investment categories, such as alternative strategy funds and sector funds. We exclude money market funds, index funds, and closed-end funds from our sample. We also exclude funds with multiple investment advisors. The Morningstar Direct Mutual Fund database lists multiple share classes separately. We aggregate the share-class levels to fund-level data. Specifically,

we calculate total AUM as the sum of assets across all share classes and compute the value-weighted average of other fund characteristics across share classes.

Another data source is the SEC EDGAR (Electronic Data Gathering, Analysis, and Retrieval) database. We locate from EDGAR the SAI for each fund in our sample for each year from 2006 to 2011. We then manually collect the information on the structure of and the method used to determine the compensation of portfolio managers. We relate these compensation structures to fund performance and risk-taking in the year following the SAI year. Moreover, we obtain advisory fee information contained in the N-SAR filings available via EDGAR. The N-SAR data set is matched by fund ticker and fund name to the Morningstar database.

Finally, we obtain equity holdings of domestic equity funds in our sample from the Thomson Reuters Mutual Fund Holdings database, which contains the quarterly equity holdings of U.S. open-end mutual funds. To merge the Morningstar Direct Mutual Fund database and Thomson Reuters Mutual Fund Holdings database, we first use fund tickers and fund CUSIPs, whenever available.[8] We then match the remaining sample manually using fund names.

3.2. Variable construction

3.2.1. Compensation structures

As discussed above, mutual funds are not required to disclose the actual dollar amount of compensation received by their portfolio managers. Instead, they need disclose only the structure of and the method used to determine portfolio manager compensation. To capture the different aspects of compensation structures of portfolio managers, we construct the following variables. Note that, except for *Fixed Salary*, the variables that describe compensation structure are not necessarily mutually exclusive.

[8] For the Thomson Reuters Mutual Fund Holdings database, we obtain fund tickers and CUSIPs from the CRSP Mutual Fund database using the MFLINKS tables. For more details about the MFLINKS tables, see Wermers (2000).

Fixed Salary: Portfolio manager compensation can be a fixed salary or a fixed salary plus a variable component, commonly referred to as a bonus. To differentiate between these two types of compensation structure, we use an indicator variable, *Fixed Salary*, which equals 1 if the portfolio manager's compensation is fixed, and zero if the compensation has both fixed and variable components.

Performance Pay: For those portfolio managers who have both a fixed salary and a variable bonus, the SEC requires the fund to disclose whether the bonus is based on the fund's investment performance over a certain period. The indicator variable *Performance Pay* equals 1 if the bonus is explicitly linked to fund performance, zero otherwise.

Evaluation Period: In the case of a performance-based bonus, a fund is required to state the length of the period over which performance is measured. In many cases, funds report multiple evaluation periods such as "one-, three-, and five-year window." We construct the following variables: *Evaluation Period Min*, which takes the value in years of the shortest evaluation window, and *Evaluation Period Max*, which takes the value of the longest evaluation window. *Evaluation Period Median* is the median evaluation window if there are three or more evaluation periods disclosed. In our empirical analysis, we use the average of the shortest and longest evaluation periods as our measure of evaluation period (i.e., *Evaluation Period*).

AUM Pay: For those portfolio managers who have both a fixed salary and a variable bonus, the SEC requires the fund to disclose whether the bonus is based on the value of assets held in the fund's portfolio. We construct an indicator variable, *AUM Pay*, which equals 1 if the portfolio manager's compensation is explicitly tied to fund AUM, zero otherwise.

Advisor-Profits Pay: Similar to *Performance Pay* and *AUM Pay*, we construct an indicator variable, *Advisor-Profits Pay*, which takes the value 1 if portfolio manager compensation is explicitly tied to overall profits of the investment advisor, zero otherwise.

3.2.2. Advisor and manager characteristics

Advisor Size: To proxy for advisor size, we calculate total AUM of the investment advisor by summing AUM of all funds managed by the advisor.

Subadvisor: Following Chen, Hong, and Kubik (2013), a fund is categorized as externally subadvised (outsourced) if the investment advisor or subadvisor managing the portfolio is not affiliated with the mutual fund family. The SEC defines *affiliated* as either ownership of or some controlling interest in the other party. We categorize a fund as subadvised if the family name does not match the advisor name (both obtained from N-SAR filings). When fund families and investment advisors have different names, we use the information in the fund's SAI to check whether there exists any affiliation between the two. The variable *Subadvisor* is set to 1 if there is no affiliation between the mutual fund family and the investment advisor; otherwise it is set to zero.

Owner: This is an indicator variable that equals 1 if the portfolio manager is the founder, controlling owner, principal partner, or blockholder of the investment advisor, zero otherwise. In other words, a positive value of *Owner* indicates that at least one of the portfolio managers working for the fund has vested interests in the investment advisor. We obtain this information from the portfolio manager description (biography) in the SAI.

Team Mgmt.: This is an indicator variable equal to 1 if the fund is managed by a team of portfolio managers and zero if the fund is managed by a single manager.

Manager Tenure: This variable is defined as the number of months that a manager(s) has been at the helm of a mutual fund. In the case of a management team, we use the value of average tenure across all team members.

3.2.3. Fund characteristics

Fund Performance: We employ two measures of risk-adjusted performance in our empirical analysis: *Benchmark-Adjusted Alpha* and *Six-Factor Alpha*. As in equation (1), *Benchmark-Adjusted*

Alpha is computed by regressing monthly excess returns of a fund on the excess returns of its Morningstar benchmark (i.e., Morningstar category average return) each calendar year.[9]

$$R_{it} - R_{ft} = \hat{\alpha}_i + \hat{\beta}_{i,k} F_{kt} + \omega_{it}, \qquad (1)$$

where $R_{it} - R_{ft}$ is the net-of-fee return of fund *i* in month *t* minus the risk free rate; F_{kt} is the excess return of benchmark portfolio *k* at month *t*; $\hat{\alpha}_i$ is the monthly *Benchmark-Adjusted Alpha*. We multiply this alpha measure by 12 to annualize it in all our empirical analyses.

Six-Factor Alpha is estimated using the Carhart (1997) four-factor model (adjusting for market, size, book-to-market, and momentum factors) augmented with a bond factor (Barclays U.S. Aggregate Bond Index) and an international factor (MSCI World Ex U.S. Index). Unlike *Benchmark-Adjusted Alpha*, which employs only 1 factor in the model, we cannot use the same in-sample estimation technique to estimate six-factor alpha with 12 monthly observations without introducing too much noise. Therefore, for *Six-Factor Alpha*, we first estimate the factor loadings using the preceding 24-month fund net returns, then calculate monthly out-of-sample alpha using the six-factor model.[10] We average the monthly alphas across a year and multiply by 12 to obtain an annualized six-factor alpha.

Fund Risk: To measure the risk of a fund, we first compute *Total Risk* as the standard deviation of monthly fund net returns in a calendar year. We then construct a systematic risk measure, defined as the loading $\hat{\beta}_{i,k}$ on the benchmark portfolio in equation (1). Further, for the subsample of U.S. equity funds, we construct two variables that capture half-year risk shifting behavior (e.g., Brown, Harlow, and Starks, 1996; Chevalier and Ellison, 1997; Kempf, Ruenzi, and Thiele, 2009).

[9] We also calculated benchmark-adjusted alpha using fund prospectus benchmark or analyst assigned benchmark, both available in the Morningstar Direct Database, and obtain similar results.

[10] The monthly out-of-sample alpha is calculated as the difference between a fund's net-of-fee return in a given month and the sum of the product of the six-factor betas estimated over the previous 24-months and the factor returns during that month. Our results are similar if we use 36 months to estimate the factor betas.

Following Kempf, Ruenzi, and Thiele (2009), we use fund portfolio holdings to construct the risk adjustment ratio and difference, respectively, as follows:

$$Risk\ Shift\ Ratio_{i,t} = \sigma_{i,t}^{2,int} / \sigma_{i,t}^{1}, \quad (2)$$

$$Risk\ Shift\ Diff_{i,t} = \sigma_{i,t}^{2,int} - \sigma_{i,t}^{1}. \quad (3)$$

For fund *i* in year *t*, we compute the intended portfolio risk variable, $\sigma_{i,t}^{2,int}$, in the second half of the year based on the actual portfolio weights in the second half of the year and the volatility of a stock in the first half of the year. We then calculate the intended risk adjustment ratio, equation (2), by taking the ratio of the intended portfolio risk in the second half of the year and the realized portfolio risk in the first half of the year, $\sigma_{i,t}^{1}$, computed from the actual portfolio weights and stock volatility in the first half of the year. We use the standard deviation of 26 weekly fund returns to measure fund volatility for each half-year period. By design, this measure captures the effect of active changes in portfolio composition in the second half of the year and is unaffected by changes in stock volatility. We also compute the difference between intended and realized portfolio risk, namely *Risk Shift Diff*, as in equation (3).

Advisory Contract Features: Performance Adv. Fee is a dummy variable that equals 1 if the fund employs a fulcrum advisory fee, which rewards and penalizes the advisor for the fund's investment performance, zero otherwise. Following Massa and Patgiri (2009), *Coles Incentive Rate* is defined as the difference between the last and first marginal advisory fee rates divided by the effective marginal advisory fee rate, all as a percentage of fund AUM. A value of zero for this measure represents a linear advisory fee schedule. *Coles Incentive Rate* takes negative values for concave advisory fee structures.

Other Variables: *Fund Size* is the sum of AUM across all share classes of the fund; *Fund Age* is the age of the oldest share class in the fund; *Expense* is determined by dividing the fund's operating expenses by the average dollar value of its AUM; *Turnover* is defined as the minimum of

sales or purchases divided by total net assets of the fund; *Net Return* is defined as cumulative monthly net return over a year; *Net Flows* is constructed as the difference between fund share sales and redemption obtained from fund N-SAR filings, divided by total net assets of the fund.

3.3. Sample overview

Our final sample consists of 5,040 unique mutual funds from 814 investment advisors, covering 22,565 fund-year observations. These observations are evenly distributed across the sample period of 2006–2011: 2006 (15.9%), 2007 (16.7%), 2008 (16.9%), 2009 (17.2%), 2010 (16.8%), and 2011 (16.5%). The sample distributions across investment categories are as follows: equity funds (40.6%), bond funds (27.2%), global funds (14.6%), balanced funds (7.8%), and other funds (9.7%).

We report summary statistics of portfolio manager compensation structure in Table 1 Overall, we find that the reported compensation structure is subjective and discretionary rather than objective and formula based. In general, this finding is consistent with the survey evidence documented by Farnsworth and Taylor (2006). Fixed salary is rarely observed in the sample. Only 3.2% of the sample funds claim that their managers' compensation is static and does not vary with any outside factors. In the vast majority of cases, portfolio manager compensation consists of both a fixed base salary and a variable component, namely, a bonus. The weights of the base salary and the bonus in total compensation, however, are generally not publicly available, since the SEC does not require that this information be disclosed. Based on a small proportion of funds that voluntarily release information on bonus size relative to base salary, we observe that the bonus can be as large as one to three times base salary.

[Insert Table 1 here]

We find that for about three-quarters of our sample funds, portfolio manager compensation is directly tied to fund investment performance. We observe that the performance-based incentive is

asymmetric: advisors reward managers for outperformance relative to the assigned benchmark, but do not penalize them for underperformance. As for the length of the period over which investment performance is measured, we observe that the average evaluation window is about three years on a rolling-window basis. The variation in evaluation periods is significant, with the longest evaluation window being 10 years and the shortest being 1 quarter.

Contrary to the pattern in advisory contracts, in the majority of cases, portfolio manager compensation is not explicitly tied to the fund's AUM. Only 19.2% of funds in our sample explicitly mention that the investment advisor considers the fund's AUM when deciding the bonus in portfolio manager compensation. Moreover, we find that for 51.5% of our sample funds, portfolio manager compensation is explicitly stated to be linked to the profitability of the investment advisor. Arguably, these portfolio managers' compensation is indirectly tied to the AUM of the fund, since advisor profitability depends on the advisory fee rates and total AUM of the advisor.

As mentioned above, performance-based, AUM-based, and advisor-profits-based incentives are not mutually exclusive when compensating a portfolio manager. We further breakdown the distribution of these three types of bonus in Panel B of Table 1. We find that, out of 21,834 fund-year observations that include variable compensation, 7,713 (35.3%) offer managers a bonus based only on investment performance, 211 (1%) offer a bonus based only on AUM; and 3,256 (14.9%) offer a bonus based only on advisor profits.[11] For the remaining 48.8% of the sample, managers receive some combinations of the three types of bonus. There are 2,391 (11%) cases where managers receive all three types of bonus simultaneously, and there are 956 (4.4%) cases where the manager's compensation is entirely subjective and does not depend on any specific stated factor. These results speak to the empirical relevance of performance-based bonuses, both in isolation and in combination with other incentives.

[11] Note that the figures on bonuses based on the advisor's profit may be underestimated because their disclosure is not required by the SEC.

We find that cross-sectional variation in portfolio manager compensation structure arises mainly at the advisor level. In particular, we find that only 39, or 4.7%, of 814 advisors exhibit some within-advisor variation in the compensation features that we examine. In the case of team-managed funds, we do not observe much variation in the structure of compensation for different managers working for the same fund. The only exception is when one manager in a team is the controlling owner of the advisory firm. In such cases, we consider only the owner's compensation structure in our analysis. Given this data structure, we conduct our analysis at the fund level and cluster the standard errors at the advisor level in all our main test specifications (Petersen, 2009). We also observe that portfolio manager compensation structures are similar across years in our sample period, and across fund investment categories (see Tables IA.1 and IA.2 of the Internet Appendix).[12]

In Table 2, we report summary statistics on investment advisor, portfolio manager, and fund characteristics, and the correlation matrix of these variables. A typical (average) fund in our sample has about $1.4 billion in AUM, a 14-year history, a 1.2% expense ratio, and a 94.5% turnover ratio. Such fund is part of a family of funds with a total of $67.6 billion AUM. The average manager tenure is 5 years. For 19% of our sample funds, there is at least one portfolio manager who is the controlling owner of the investment advisor. Similar to the evidence of Chen, Hong, and Kubik (2013), 21% of sample funds are managed by an unaffiliated subadvisor. In our sample, the average annualized benchmark-adjusted alpha and the six-factor alpha are 0.34% and 0.18%, respectively. On average, total fund risk is 4.26% and the beta loading on a fund's Morningstar benchmark is very close to 1. The mean half-year risk-shifting measure of our sample equity funds is 1.03 in ratio and 0.10% in difference. Our sample funds experience 1.05% monthly inflows during the sample period. Similar to Elton, Gruber and Blake (2003), we find that only 4.2% of funds have symmetric performance-incentive fees in the advisory contract. Finally, the average *Coles Incentive Rate* measure is -0.12

[12] At the individual fund level, portfolio manager compensation structures rarely change over time during our sample period, except in a few cases when there is a change in the fund's investment advisor.

(i.e., a concave advisory fee structure), similar to the mean value of -0.11 reported in Massa and Patgiri (2009).

[Insert Table 2 here]

4. Portfolio manager compensation and fund performance

In this section, we examine the impact of portfolio manager compensation on mutual fund performance. We first investigate the difference in performance between funds whose portfolio manager compensation is linked to investment performance and those in which they are not. We then further compare the performance difference among various compensation arrangements, namely performance-based compensation, AUM-based compensation, advisor-profits-based compensation, and fixed salary. Finally, we examine the effect of the length of the evaluation period on fund performance using the subsample of managers with performance-based pay.

4.1 Performance-based pay and fund performance

We define performance-based pay as a reward structure that explicitly links manager compensation to fund performance. We hypothesize that such an arrangement is designed by investment advisors to either induce managerial effort or attract the best managers. Both arguments lead to one empirical prediction: a positive relation between performance-based compensation and future fund performance.

To test this empirical prediction, we first conduct a univariate analysis by comparing risk-adjusted performance between funds that link their manager compensation directly to investment performance (17,381 fund-year observations, 77%) and those that do not (5,184 fund-year observations, 23%). The results suggest that funds with performance-linked pay significantly outperform those without. The annualized benchmark-adjusted alpha and the six-factor alpha for

funds with performance-based pay are 0.43% and 0.348%, respectively. In contrast, managers without explicit performance-based pay deliver an average annualized benchmark-adjusted alpha of 0.033% and a six-factor alpha of -0.386%. The difference in performance between the two samples is 0.397% and 0.734%, respectively, both significant at the 1% level.

We next estimate whether this positive relation between performance-based compensation and fund performance holds in a multivariate setting. Specifically, we employ the following ordinary least squares (OLS) specification in our empirical analysis:

$$Y_{i,t} = \alpha + \beta_1 * Performance\ Pay_{i,t-1} + \gamma_1 * Controls_{i,t-1} + \lambda_{category} + \alpha_t + \mu_{i,t}. \qquad (4)$$

The dependent variable $Y_{i,t}$ is the risk-adjusted performance of fund i in year t. The main independent variable of interest, $Performance\ Pay$, is an indicator variable that equals 1 if the fund manager received performance-based compensation in the preceding year, zero otherwise. The estimated slope coefficient β_1, therefore, captures the impact of performance-based pay on fund performance. We include a vector of advisor, manager, and fund characteristics to control for their effect on fund performance. Our control variables include lagged alpha, advisor size, subadvisor dummy, controlling owner dummy, team management dummy, manager tenure, fund size, fund age, expense ratio, turnover ratio, fund flow, fund risk, performance advisory fee dummy, and Coles Incentive Rate measure. All the independent variables are measured as of the previous year-end, to avoid potential reverse causality concerns. We also control for fund category fixed effects and year fixed effects in the regression. Standard errors are clustered at the advisor level.

We report the results of the regression in Table 3. Risk-adjusted performance is measured by benchmark-adjusted alpha, in columns (1) to (3), and six-factor alpha, in columns (4) to (6). Consistent with the univariate results, we find that risk-adjusted performance is significantly higher for managers with performance-based compensation. We then use benchmark-adjusted alpha and six-factor alpha as the dependent variables. In the baseline regressions without controls, reported in

columns (1) and (4), the estimated slope coefficients on *Performance Pay* are, respectively, 0.397 and 0.734, both significant at the 5% level or better. When we include all the control variables and fixed effects, in columns (3) and (6), the coefficients are 0.402 and 0.555, respectively, both significant at the 5% level or better. These results imply that funds with performance-based portfolio manager compensation outperform those without such compensation by 40.2 to 55.5 basis points per annum after risk adjustment. These findings are also economically significant given that trillions of dollars of assets in the mutual fund industry are managed by portfolio managers who receive performance-based pay.

[Insert Table 3 here]

4.2 Other compensation structures and fund performance

We next examine whether and how other compensation schemes, such as pay linked to fund AUM, pay linked to advisor profits, and fixed salary relate to fund performance. These alternative compensation arrangements provide us with "counter-factual" tests on the relation between performance-based pay and fund performance. They also serve as a "horse race" test on the link between various compensation schemes and fund performance.

We first conduct univariate analyses that compare the difference in the average performance between managers who receive, respectively, AUM-based compensation, advisor-profits-based compensation, or fixed salary, and those who do not. The results are reported in Panel A of Table 4. We find that, unlike in the case of performance-based compensation, the use of AUM-based or advisor-profit-based compensation is not associated with significantly better fund performance. Moreover, we find that the use of fixed salary is associated with inferior performance. Funds whose managers receive a fixed salary underperform their counterparts by 74.4 basis points per annum

based on the benchmark-adjusted alpha and by 106.0 basis points per annum based on the six-factor alpha, both significant at the 5% level or better.

[Insert Table 4 here]

We next run a horse race among various compensation schemes by adding the variables *AUM Pay*, *Advisor-Profits Pay*, and *Fixed Salary* to model (4). We present the estimation results in Panel B of Table 4. Again, risk-adjusted performance is measured by the benchmark-adjusted alpha, in columns (1) to (3), and the six-factor alpha, in columns (4) to (6). Our regression results confirm that, in contrast with performance-based pay, AUM-based pay or advisor-profit-based pay are not associated with better fund performance. The coefficients on these two variables are mostly negative and not significantly different from zero. In contrast, the coefficients on *Performance Pay* remain positive and significant in all specifications, with magnitudes similar to the figures reported in Table 3. Further, we conduct an F-test between the coefficient of performance pay and each of the coefficients of the other compensation schemes. As shown at the bottom of Table 4, in all three cases, we reject the null hypothesis that the two coefficients are equal. Funds with performance-based pay outrun funds with fixed salary, AUM-based pay, and advisor-profits–based pay by 59.8 (70.6), 67.2 (74.4), and 36.6 (69.5) basis points per annum as measured by benchmark-adjusted (six-factor) alpha, respectively. The performance difference among managers with fixed salary, AUM-based, or advisor-profits-based pay is not significantly different from zero. This evidence further suggests that performance-based compensation is related to better fund performance, and that this positive effect on performance is not shared by other compensation schemes.

4.3 Evaluation period and fund performance

According to SEC Rule S7-12-04, if portfolio manager compensation is linked to fund performance, the fund is required to disclose the length of the period over which performance is

measured. In this section, we focus on those funds with performance-based compensation, and examine the effect of evaluation period on fund performance.

As explained in the Introduction, short evaluation periods can damage fund performance, since they induce managers to engage in such activities as excessive risk-taking and window dressing. Longer evaluation periods can mitigate these adverse incentives and help identify portfolio manager skills. However, too long an evaluation period can protect managers from dismissal in the short-run and induce self-serving behavior, such as shirking and herding. Hence, *ex-ante*, the net effect is unclear. It may be argued that the optimal horizon to evaluate manager investment performance is the one that matches shareholder investment horizon.[13] It is an empirical question whether and how the evaluation period impacts fund performance.

Out of 17,381 fund-year observations with performance-based portfolio manager pay, 14,779, or 85%, report their evaluation periods in SAIs. We find that most sample funds report multiple evaluation windows, and the window ranges from 0.25 years (one quarter) to 10 years. The typical evaluation period is 3 years (44.3%) on a rolling window basis. Therefore, we use 3 years as the cut-off and sort the sample into three groups based on evaluation period. We then perform *t*-tests on average performance between groups. We report the results in Panel A of Table 5.

[Insert Table 5 here]

The results from the univariate analyses suggest a positive, linear relationship between evaluation period and fund performance. Those managers who have an evaluation period of less than 3 years (average 1.9 years) generate 0.312% of benchmark-adjusted alpha. The benchmark-adjusted alpha increases to 0.484% when the evaluation period is 3 years. The increase of 0.172% is statistically significant at the 5% level. The increase in the benchmark-adjusted alpha continues as

[13] There exists no direct evidence on the holding periods of mutual fund investors. The consensus is that the typical fund shareholder redeems shares infrequently. According to Sirri and Tufano (1998), the average holding period of equity mutual funds is approximately seven years.

the evaluation window grows: Managers who have an evaluation period of more than 3 years (average 5 years) generate 0.802% benchmark-adjusted alpha. The difference of 0.318% is significant at the 1% level. When we use six-factor alpha as an alternative measure of fund performance, the results are similar.

SEC rules mandate that, if using performance-based compensation, the performance benchmark should be disclosed. However, out of 14,779 fund-year observations that report evaluation periods, only 11,760 (80%) clearly identify the benchmark used to measure performance. For example, a common benchmark for large-cap growth equity funds is the Russell 1000 Growth Index. Arguably, clearly reporting the performance benchmark signals a true commitment to using performance-based compensation as a meaningful incentive mechanism. Following this intuition, we examine whether the positive link between the duration of the evaluation period and fund performance is affected when a clear benchmark is provided. We repeat the univariate analyses using only sample funds with clearly stated performance benchmarks in their SAIs. Results are reported in the second half of Panel A of Table 5.

We find that the positive relationship between evaluation period and fund performance becomes much stronger in the subsample in which a clear evaluation benchmark is specified. Managers who have an evaluation period of less than 3 years generate 0.116% per annum, as measured by benchmark-adjusted alpha. Alpha increases by 0.279% and 0.550% when the evaluation period increases to 3 years and more than 3 years, respectively. The increase in alpha is significant at the 1% level in all specifications, with the magnitude almost double compared to the corresponding figures with all managers having performance-based pay. Again, we find a very similar pattern when we use the six-factor alpha as an alternative measure of fund performance.

To corroborate these univariate results, we next estimate the following multivariate regression, which models the impact of evaluation period on fund performance:

$$Y_{i,t} = \alpha + \beta * EP_{i,t-1} + \gamma * Controls_{i,t-1} + \lambda_{category} + \alpha_t + \omega_{i,t}. \qquad (5)$$

The dependent variable $Y_{i,t}$ is the risk-adjusted performance of fund i in year t. The main independent variable of interest EP is the average number of years over which investment performance is measured for performance-based compensation. The coefficient β captures the impact of the evaluation period on fund performance. Again, we control for a vector of advisor, manager, and fund characteristics. We include fund category and year fixed effects in the regression. Standard errors are clustered at the advisor level.

We report the OLS estimation results in Panel B of Table 5. Risk-adjusted performance is measured by the benchmark-adjusted alpha, in columns (1) to (3), and the six-factor alpha in columns (4) to (6). Consistent with the univariate results in Panel A, we find that risk-adjusted performance improves as the evaluation period increases. In our baseline specifications without controls, the estimated coefficients on *Evaluation Period* for the benchmark-adjusted alpha and the six-factor alpha are 0.185 and 0.197, respectively, both significant at the 5% level or better. This finding implies that an additional year in an evaluation period corresponds to an increase in risk-adjusted performance of about 20 basis points per annum. Statistical significance becomes slightly weaker when we include control variables and fixed effects.

We repeat the above multivariate analyses for the subsample of funds with clearly stated performance evaluation benchmarks, and report the results in Panel C of Table 5. We find that the relation between evaluation period and abnormal performance becomes both statistically and economically stronger when a clear benchmark is provided. The estimated slope coefficients on *Evaluation Period* are all positive and significant at the 5% level or better. In terms of economic magnitude, a one-standard-deviation (i.e., 1.2 years) increase in evaluation period is associated with a 35.4 (27.1) basis points improvement in annualized, benchmark-adjusted (six-factor) alpha. We also estimate equation (5), replacing the average evaluation period with the minimum and maximum

evaluation periods. Results show that it is the maximum, not the minimum, evaluation window that is related to superior fund performance (see Table IA.3 of the Internet Appendix).

Overall, both the univariate and multivariate results in Table 5 suggest that portfolio managers with longer evaluation periods are associated with better investment performance. We interpret these findings as consistent with the hypothesis that a longer evaluation period helps to ensure that managers' and investors' interests are aligned regarding the decision horizon for investments.

4.4 Summary

Taken together, managers with performance-based compensation exhibit superior subsequent abnormal performance, especially when advisors link pay to performance over longer evaluation periods, and with respect to a clearly stated benchmark. In contrast, we do not find a similar effect for alternative compensation arrangements, such as fixed salary, pay linked to fund assets, or advisor profits. Our evidence suggests that explicit performance-based compensation with longer evaluation periods can induce greater managerial effort or attract more skilled managers.

5. Portfolio manager compensation and fund risk-taking

In this section, we examine how portfolio manager compensation structures affect fund risk-taking behavior. In particular, we first analyze how fund risk level is related to various compensation structures. We further examine half-year risk-shifting behavior by analyzing portfolio holdings of diversified U.S. equity funds.

5.1 Fund risk and portfolio manager compensation

Contracts with convex payoffs can increase the incentive to take risks (e.g., Grinblatt and Titman, 1989). However, this notion is challenged by Carpenter (2000) and Ross (2004). In the context of this inconclusive theoretical debate, we examine empirically how various compensation structures affect fund risk-taking. Further, we examine how fund risk-taking relates to length of evaluation period for managers receiving performance-based pay.

In particular, we estimate the following OLS specification:

$$FundRisk_{i,t} = \alpha + \beta_1 * CompStruct_{i,t-1} + \gamma_1 * Controls_{i,t-1} + \lambda_{category} + \alpha_t + \mu_{i,t,} \quad (6)$$

where $FundRisk_{i,t}$ is the standard deviation of monthly return or the beta loading on the benchmark of fund i in year t. In each specification, $CompStruct_{i,t-1}$ refers to fixed salary, performance-based pay, AUM-based pay, advisor-profits-based pay, and average evaluation period, respectively.[14] We include lagged fund total risk (or fund beta) and a vector of lagged advisor, manager, and fund characteristics as control variables. We also control for category fixed effects and year fixed effects in the regression and cluster the standard errors at the advisor level.

We report the results in Table 6. As shown in column (1), the coefficient on fixed salary is negative and significant at the 5% level. In terms of economic significance, the difference in fund risk for portfolio managers with fixed salary versus variable bonus-type pay is 0.5% (= 0.135*$\sqrt{12}$) on an annualized basis. In column (2), we add other compensation structures into the regression and find that the coefficient on fixed salary remains unchanged. We further carry out an F-test to compare the coefficients of different compensation structures. We find that the difference between the coefficients of each of the three variable bonus-type structures and fixed salary is positive and significant at the 10% level or better, while the differences among the three bonus-type structures are

[14] The estimation results of equation (6) using minimum and maximum evaluation periods instead of average evaluation period are reported in Table 1A.4 of the Internet Appendix.

not significantly different from each other. Our results suggest that portfolio managers with fixed salary take less risk than those with variable bonus-type pay, including performance-based pay, AUM-based pay, and advisor-profits-based pay. Results are similar if we use fund beta, instead of total risk, as the dependent variable in column (5). We also test whether portfolio managers with longer evaluation periods take less risk conditional on receiving performance pay. We find little support for this hypothesis. The coefficients on *Evaluation Period* are negative but insignificant at conventional levels, as shown in columns (3) and (6).

[Insert Table 6 here]

5.2 Tournaments, risk shifting, and portfolio manager compensation

Following Kempf, Ruenzi, and Thiele (2009), we use portfolio holdings to study funds' half-year risk-shifting behavior in a tournament setting, which allows one to capture managers' intended rather than realized changes in portfolio risk.[15] In particular, we use portfolio holdings to construct the risk adjustment ratio and difference, respectively, as in equations (2) and (3). Since our measures require the availability of fund portfolio holdings, we restrict our analysis to actively managed, diversified U.S. equity funds.

Analogously to our analysis in the subsection above, we estimate the following OLS specification using risk shifting measures, rather than fund risk, as our dependent variable:

$$RiskShift_{i,t} = \alpha + \beta_1 * CompStruct_{i,t-1} + \gamma_1 * Controls_{i,t-1} + \lambda_{category} + \alpha_t + \mu_{i,t}, \quad (7)$$

where $RiskShift_{i,t}$ represents a risk shifting measure of fund *i* in year *t;* $CompStruct_{i,t-1}$ refers to fixed salary, performance-based pay, AUM-based pay, advisor-profits-based pay, and average evaluation period, respectively. We include the lagged dependent variable and a vector of lagged

[15] We do not use realized changes in risk based on fund returns to measure funds' half-year risk-taking behavior, since this can be affected by changes in the risk of stocks in the portfolio and it does not allow us to capture intended changes in fund risk (e.g., Chevalier and Ellison, 1997; Kempf, Ruenzi, and Thiele, 2009; Huang, Sialm, and Zhang, 2011).

advisor, manager, and fund characteristics as control variables. We also control for category fixed effects and year fixed effects in the regression and cluster the standard errors at the advisor level.

We report the estimation results in Table 7. Columns (2) and (5) of Table VII show that the coefficient of fixed salary is lower than the coefficients of AUM-based pay and advisor-profits-based pay, with both differences significant at the 5% level. This result suggests that portfolio managers with fixed salary engage in less half-year risk shifting activities compared to those with AUM or advisor-profits-based pay. Moreover, conditional on receiving performance pay, managers with longer evaluation periods have less half-year risk shifting behavior, as shown in columns (3) and (6). We also estimate equation (7), replacing the average evaluation period with the minimum or maximum evaluation periods. We find that it is the maximum evaluation period that drives the relation between average evaluation period and risk shifting behavior (see Table IA.5 of the Internet Appendix).

[Insert Table 7 here]

Overall, the evidence described in this section suggests that portfolio manager compensation structures matter for fund risk-taking. Managers with variable bonus-type pay take higher fund risk compared to those with fixed salary. Conditional on receiving performance pay, portfolio managers with longer evaluation periods engage less in risk-shifting activities.

6. Cross-sectional determinants of portfolio manager compensation

In this section, we analyze cross-sectional variation in the compensation structure of portfolio managers. We investigate the determinants of several compensation structures by estimating the following linear probability model:

$$Y_{i,j} = \beta\, AdvisorChar_j + \gamma\, MgrChar_{i,j} + \lambda\, FundChar_{i,j} + \lambda_{category} + \alpha_t + \varepsilon_{i,j}. \qquad (8)$$

The dependent variable $Y_{i,j}$ denotes a particular portfolio manager compensation arrangement, such as *Performance Pay*, *AUM Pay*, *Advisor-Profits Pay, Fixed Salary*, or *Evaluation Period*. The independent variables include a vector of lagged advisor, fund, and manager characteristics, as discussed in Section 2.2. We control for fund category and year fixed effects. Standard errors are clustered at the advisor level. We also analyze the determinants of average evaluation period for managers with performance-linked pay using an OLS specification, as specified in equation (8).[16]

The results are reported in Table 8. First, we find that larger advisors use performance-based incentives more frequently, as shown by the coefficient of *Log Advisor Size* in column (1). Similarly, the probability of receiving a fixed salary decreases with advisor size, as shown in column (4). Both effects are statistically significant at the 1% level. They are also economically meaningful: A one-standard-deviation increase in *Log Advisor Size* is associated with an increase in the probability of performance-based incentives of 11.9% (= 3.3*3.6%) and a decrease in the probability of receiving a fixed salary of 4.0% (= 3.3*1.2%), respectively.[17] The above findings are consistent with the idea that larger investment advisors are unable to monitor portfolio managers' actions as effectively as smaller advisors. Thus, they are more likely to reward their employees through contracts that explicitly link pay to observed measures of performance (e.g., Harris and Raviv, 1979; Holmstrom, 1979; Grossman and Hart, 1983).

[Insert Table 8 here]

Second, we find that the probability of receiving performance-based pay is lower for portfolio managers with a controlling stake in the investment advisor, as shown in column (1). When a portfolio manager is a controlling stakeholder of the advisor, agency conflicts due to the separation between ownership and control are largely reduced (Jensen and Meckling, 1976), which lowers the

[16] The results remain very similar if we use logistic regressions to model the existence of performance-based pay, AUM-based pay, advisor-profits-based pay, or fixed salary.

[17] The economic effect of a variable of interest is calculated as the standard deviation of that independent variable times the corresponding marginal effect. The standard deviation of *Log Advisor Size* in our sample is 3.30.

need for performance-based incentives in the compensation contract. The economic magnitude of the effect of *Owner* is significant. The probability of performance-based incentives decreases by 36.4% if a portfolio manager becomes an advisor's controlling stakeholder. As expected, compensation of managers with a controlling stake in the advisor is more likely to be linked to the advisor's profits, as shown in column (3). The probability of receiving this type of compensation increases by 35.2%. Moreover, investment advisors are more likely to link portfolio manager compensation to AUM or to simply use fixed salary for funds that attract lower capital flows. Finally, the evaluation period is longer for younger funds and funds with lower portfolio turnover rate, conditional on investment advisors granting performance-based compensation.

7. Concluding Remarks

We use a hand-collected data set of over 5,000 funds to study the compensation incentives, and their effectiveness, of individual portfolio managers in the U.S. mutual fund industry. Since the decisions of individual portfolio managers affect the performance of trillions of dollars of assets invested in the mutual fund industry, it is of great importance to understand the incentives provided by the compensation structures designed by investment advisors.

Unlike the advisory contract, which is mostly based on fund AUM, the majority of compensation contracts for individual portfolio managers include a bonus directly linked to investment performance. Much of the literature assumes that the compensation structure of investment advisors and individual portfolio managers coincides. Our evidence clearly suggests otherwise. In contrast to tight regulation of advisory contracts, the SEC places no specific restriction on the compensation contracts of individual portfolio managers. We show that, in an unregulated setting, asymmetric, option-like, performance-based incentives are the dominant form of

compensation for individual portfolio managers. Our empirical evidence provides guidance for theoretical models on portfolio delegation in the asset management industry.

Our analysis further shows that managers with performance-based, bonus-type pay exhibit superior future fund performance, especially when advisors link pay to performance over longer time periods. In contrast, we do not find similar results for alternative compensation arrangements, such as fixed salary and pay linked to fund assets or advisor profits. The compensation structure of portfolio managers also impacts fund risk-taking. Altogether, we document that the compensation contract between portfolio managers and advisors plays a critical role in mutual fund incentive alignment, performance, and risk-taking. This study also suggests that SEC-mandated disclosure of the structure of mutual fund manager compensation reveals valuable information to fund investors for assessment of managerial incentives and prediction of future fund performance.

Finally, we acknowledge two limitations of this study. First, we analyze the structures of compensation rather than dollar amounts. This is a consequence of the nature of the information disclosure required by the SEC. Second, we do not disentangle whether the positive relation between performance-based bonus pay and fund performance is driven by inducing greater managerial effort or attracting better managers. We leave this issue for future research.

References

Agarwal, V., N. D. Daniel, and N. Y. Naik, 2009, Role of Managerial Incentives and Discretion in Hedge Fund Performance, Journal of Finance 64, 2221-2256.

Brown, K.C., W. V. Harlow, and L. T. Starks, 1996, Of Tournaments and Temptations: An Analysis of Managerial Incentives in the Mutual Fund Industry, Journal of Finance 51, 85-110.

Basak, S. and A. Pavlova, 2013, Asset Prices and Institutional Investors, American Economic Review 103, 1728-1758.

Basak, S., A. Pavlova, and A. Shapiro, 2007, Optimal Asset Allocation and Risk Shifting in Money Management, Review of Financial Studies 20, 1583-1621.

Basak, S., A. Pavlova, and A. Shapiro, 2008, Offsetting the Implicit Incentives: Benefits of Benchmarking in Money Management, Journal of Banking and Finance 32, 1883-1893.

Carhart, M., 1997, On Persistence in Mutual Fund Performance, Journal of Finance 52, 57-82.

Carpenter, J. N., 2000, Does Option Compensation Increase Managerial Risk Appetite? Journal of Finance 55, 2311-31.

Chen, J., H. Hong, and J. D. Kubik, 2013, Outsourcing Mutual Fund Management: Firm Boundaries, Incentives, and Performance, Journal of Finance 68, 523-558.

Chevalier, J. and G. Ellison, 1997, Risk Taking by Mutual Funds as a Response to Incentives, Journal of Political Economy 105, 1167-1200.

Coles, J. L., J. Suay, and D. Woodbury, 2000, Fund Advisor Compensation in Closed-End Funds, Journal of Finance 55, 1385-414.

Das, R. and R. Sundaram, 2002, Fee Speech: Signaling, Risk-Sharing, and the Impact of Fee Structures on Investor Welfare, Review of Financial Studies 15, 1465-1497.

Dass, N., M. Massa, and R. Patgiri, 2008, Mutual Funds and Bubbles: The Surprising Role of Contractual Incentives, Review of Financial Studies 21, 51-99.

Deli, D. N., 2002, Mutual Fund Advisory Contracts: An Empirical Investigation, Journal of Finance 57, 109-133.

Elton E. J., M. J. Gruber, and C. R. Blake, 2003, Incentive Fees and Mutual Funds, Journal of Finance 58, 779-804.

Elton E. J., M. J. Gruber, and C. R. Blake, 2007, Participant Reaction and the Performance of Funds Offered by 401(k) Plans, Journal of Financial Intermediation 16, 249-271.

Farnsworth, H. and J. Taylor, 2006, Evidence on the Compensation of Portfolio Managers, Journal of Financial Research 29, 305-324.

Golec, J. H., 1992, Empirical Tests of a Principal–Agent Model of the Investor-Investment Advisor Relationship, Journal of Financial and Quantitative Analysis 27, 81-95.

Golec, J. H. and L. Starks, 2004, Performance Fee Contract Change and Mutual Fund Risk, Journal of Financial Economics 73, 93-118.

Grinblatt, M., and S. Titman, 1989, Adverse Risk Incentives and the Design of Performance-Based Contracts, Management Science 35, 807-22.

Grossman, S. and O. Hart, 1983, An Analysis of the Principal–Agent Problem, Econometrica 51, 7-45.

Harris, M. and A. Raviv, 1979, Optimal Incentive Contracts with Imperfect Information, Journal of Economic Theory 20, 231-259.

Holmstrom, B., 1979, Moral Hazard and Observability, Bell Journal of Economics 10, 74-91.

Huang, J., C. Sialm, and H. Zhang, 2011, Risk Shifting and Mutual Fund Performance, Review of Financial Studies 24, 2575-2616.

Huang, J., K. D. Wei, and H. Yan, 2007, Participation Costs and the Sensitivity of Fund Flows to Past Performance, Journal of Finance 62, 1273-1311.

Jensen, M. C. and W. H. Meckling, 1976, Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure, Journal of Financial Economics 3, 305-360.

Li, C.W. and A. Tiwari, 2009, Incentive Contracts in Delegated Portfolio Management, Review of Financial Studies 22, 4681-4714.

Kempf, A., S. Ruenzi, and T. Thiele, 2009, Employment Risk, Compensation Incentives, and Managerial Risk Taking: Evidence from the Mutual Fund Industry, Journal of Financial Economics 92, 92-108.

Massa, M., and R. Patgiri, 2009, Incentives and Mutual Fund Performance: Higher Performance or Just Higher Risk Taking? Review of Financial Studies 22, 1777-1815.

Petersen, M., 2009, Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches, Review of Financial Studies 22, 435-480.

Prendergast, C., 1999, The Provision of Incentives in Firms, Journal of Economic Literature 37, 7-63.

Ross, S. A., 2004, Compensation, Incentives, and the Duality of Risk Aversion and Riskiness, Journal of Finance 59, 207-25.

Sirri, E. R. and P. Tufano, 1998, Costly Search and Mutual Fund Flows, Journal of Finance 53, 1589-1622.

Spiegel, M. and H. Zhang, 2013, Mutual Fund Risk and Market Share-Adjusted Fund Flows, Journal of Financial Economics 108, 506-528.

Starks, L. T., 1987, Performance Incentive Fees: An Agency Theoretic Approach, Journal of Financial and Quantitative Analysis 22, 17-32.

Warner, J. B. and J. Wu, 2011, Why Do Mutual Fund Advisory Contracts Change? Performance, Growth, and Spillover Effects, Journal of Finance 66, 271-306.

Wermers, R., 2000, Mutual Fund Performance: An Empirical Decomposition into Stock-Picking Talent, Style, Transactions Costs, and Expenses, Journal of Finance 55, 1655-1695.

Table 1

Summary Statistics of Portfolio Manager Compensation Structures

This table reports the distribution of compensation structures (Panel A), further breakdown of non-fixed salary (Panel B), summary statistics of evaluation periods (Panel C), and correlation coefficient matrix of the main variables used to describe portfolio manager compensation structures (Panel D). The sample consists of 22,565 fund–year observations over the period 2006-2011. The variable *Fixed Salary* is an indicator variable that equals 1 if the portfolio manager receives a fixed amount of compensation from the advisor, zero otherwise. *Performance Pay* is a dummy variable that is set to 1 if the bonus is tied to the investment performance of the fund, zero otherwise; *AUM Pay* is an indicator variable that equals 1 if portfolio manager compensation is tied to the fund's assets under management, zero otherwise; *Advisor-Profits Pay* is a dummy variable that is set to 1 if the portfolio manager's compensation depends on the advisor's profits, zero otherwise; *Evaluation Period* is the average number of years over which investment performance is measured for performance-based bonus; most funds report multiple evaluation windows, *Evaluation Period Min* is the shortest evaluation window, *Evaluation Period Max* is the longest evaluation window, and *Evaluation Period Median* is the median evaluation window if there are three or more evaluation periods disclosed. For funds that have multiple reported evaluation windows, we use the mean of *Evaluation Period Min* and *Evaluation Period Max* as *Evaluation Period*. *p*-values are in brackets.

Panel A. Summary Statistics of Compensation Structures

	# of Obs.	***% of Sample***
Total	22,565	100%
Fixed Salary	731	3.2%
Non-fixed Salary	21,834	96.8%
Performance Pay	17,381	77.0%
AUM Pay	4,338	19.2%
Advisor-Profits Pay	11,626	51.5%

Panel B. Further Breakdown of Non-fixed Salary

Performance Pay	***AUM Pay***	***Advisor-Profits Pay***	***# of Obs.***	***% of Non-fixed Salary Obs.***
1	0	0	7,713	35.3%
1	1	0	1,591	7.3%
1	0	1	5,631	25.8%
1	1	1	2,391	11.0%
0	1	0	211	1.0%
0	0	1	3,256	14.9%
0	1	1	85	0.4%
0	0	0	956	4.4%
Total Non-fixed Salary			21,834	100%

Panel C. Summary Statistics of Evaluation Periods

Variables (years)	***Obs.***	***Mean***	***Median***	***Std. Dev.***	***Min***	***Max***
Evaluation Period	14,779	3	3	1.16	0.25	7.5
Evaluation Period Min	14,779	1.62	1	1.27	0.25	5
Evaluation Period Median	7,139	3.18	3	0.75	1	5
Evaluation Period Max	14,779	4.38	5	1.87	0.25	10

Panel D. Correlation Matrix

	Fixed Salary	***Performance Pay***	***AUM Pay***	***Advisor-Profits Pay***	***Evaluation Period***
Fixed Salary	1.00				
Performance Pay	-0.30	1.00			
	[0.00]				
AUM Pay	-0.05	0.17	1.00		
	[0.00]	[0.00]			
Advisor-Profits Pay	-0.06	-0.20	0.05	1.00	
	[0.00]	[0.00]	[0.00]		
Evaluation Period	-0.03	0.04	-0.12	-0.31	1.00
	[0.00]	[0.00]	[0.00]	[0.00]	

Table 2

Summary Statistics of Advisor, Portfolio Manager, and Fund Characteristics

This table reports the summary statistics (Panel A) and the correlation coefficient matrix (Panel B) of the advisor, portfolio manager, and fund characteristics. The variable *Advisor Size* measures total assets under management of the investment advisor; *Subadviser* is a dummy variable that equals 1 if the investment advisor is not affiliated with the mutual fund family, i.e., the fund is outsourced to an independent investment firm to manage its assets. *Subadviser* takes the value zero if the fund is managed in-house; *Owner* is an indicator variable that equals 1 if the portfolio manager is the founder, controlling owner, partner, or blockholder of the investment advisor, zero otherwise; *Team Mgmt.* is a dummy variable that equals 1 if a fund is managed by multiple managers, zero otherwise; *Manager Tenure* measures the number of months that a manager(s) has been at the helm of a mutual fund. *Benchmark-adjusted Alpha* is computed by regressing monthly excess returns (net return minus 1-month T-bill rate) of a fund on the excess returns of its corresponding benchmark (i.e., the mean of excess returns of all the mutual funds in the corresponding Morningstar Category) each calendar year; *Six-factor Alpha* is estimated using the Carhart (1997) four-factor model (adjusting for market, size, book-to-market, and momentum factors), augmented with a bond factor (Barclays U.S. Aggregate Bond Index) and an international factor (MSCI World Ex U.S. Index). Both alpha measures are annualized and denoted in percentage point. *Total Risk* is the standard deviation of monthly net-of-fee returns of a fund in a calendar year; *Risk Shift Ratio* and *Risk Shift Diff* are measures of half-year risk-shifting behavior, calculated using standard deviation of weekly portfolio returns as defined in Equations (2) and (3), respectively; *Beta* is a systematic risk measure as defined in Equation (1); *Fund Size* is the sum of assets under management across all share classes of the fund; *Fund Age* is the age of the oldest share class in the fund; *Expense* is determined by dividing the fund's operating expenses by the average dollar value of its assets under management; *Turnover* is defined as the minimum of sales or purchases divided by the total net assets of the fund; *Net Return* is defined as the cumulative monthly net return over a year*; Net Flows* is constructed as the annual average of the monthly difference between fund share sales and redemption divided by total net assets of the fund; *Performance Adv. Fee* is a dummy variable that equals 1 if the fund employs a fulcrum advisory fee, which rewards and penalizes the advisor for the fund's investment performance, zero otherwise; *Coles Incentive Rate* is defined as the difference between the last and first marginal advisory fee rates divided by the effective marginal advisory fee rate. *p*-values are in brackets in Panel B.

Panel A. Summary Statistics

Variables	***Obs.***	***Mean***	***Median***	***Std. Dev.***	***1st***	***99th***
Advisor & Manager Characteristics						
Advisor Size (millions)	22,565	67,679.7	8,785.4	163,012.6	0.0	794,028.7
Subadviser (dummy)	22,565	0.21	0.00	0.41	0.00	1.00
Owner (dummy)	22,565	0.19	0.00	0.39	0.00	1.00
Team Mgmt. (dummy)	22,565	0.66	1.00	0.47	0.00	1.00
Manager Tenure (months)	22,565	66.1	52.0	50.2	3.0	240.0
Fund Characteristics						
Benchmark-adjusted Alpha (%)	22,235	0.34	0.37	5.03	-16.17	15.64
Six-factor Alpha (%)	21,766	0.18	-0.03	5.67	-17.94	18.95
Total Risk (%)	22,503	4.26	4.04	2.65	0.22	12.04
Beta	22,234	0.99	0.99	0.24	0.17	1.90
Risk Shift Ratio	7,811	1.03	1.02	0.12	0.68	1.60
Risk Shift Diff (%)	7,811	0.10	0.04	0.41	-1.61	2.04
Fund Size (millions)	22,565	1352.3	243.6	5820.4	2.6	18868.5
Fund Age (months)	22,565	168.1	147.0	126.9	13.0	747.0
Expense (%)	22,565	1.2	1.2	0.5	0.1	2.6
Turnover (%)	22,565	94.5	58.0	122.1	2.0	796.3
Net Return (%)	22,565	5.2	6.5	21.7	-51.0	62.6
Net Flows (%)	21,757	1.05	-0.11	5.20	-7.01	33.81
Performance Adv. Fee	22,523	0.042	0.000	0.201	0.000	1.000
Coles Incentive Rate	19,187	-0.123	0.000	0.211	-1.000	0.000

Panel B. Correlation Matrix

	[1]	*[2]*	*[3]*	*[4]*	*[5]*	*[6]*	*[7]*	*[8]*	*[9]*	*[10]*	*[11]*	*[12]*	*[13]*	*[14]*	*[15]*	*[16]*
Ben-adj. Alpha [1]	1.00															
Six-factor Alpha [2]	0.46	1.00														
	[0.00]															
Total Risk [3]	-0.04	-0.05	1.00													
	[0.00]	[0.00]														
Beta [4]	-0.14	-0.05	0.25	1.00												
	[0.00]	[0.00]	[0.00]													
Log Adv. Size [5]	0.04	0.04	-0.08	0.06	1.00											
	[0.00]	[0.00]	[0.00]	[0.00]												
Subadviser [6]	0.01	-0.02	0.04	0.01	-0.22	1.00										
	[0.27]	[0.01]	[0.00]	[0.18]	[0.00]											
Owner [7]	0.01	0.00	0.11	-0.02	-0.23	0.10	1.00									
	[0.04]	[0.60]	[0.00]	[0.00]	[0.00]	[0.00]										
Team Mgmt.[8]	-0.02	-0.02	0.01	-0.01	-0.08	0.06	-0.01	1.00								
	[0.02]	[0.00]	[0.28]	[0.04]	[0.00]	[0.00]	[0.05]									
Log Mgr. Tenure [9]	0.00	0.02	-0.11	-0.04	-0.03	-0.07	0.11	-0.06	1.00							
	[0.50]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]								
Log Size [10]	0.02	0.04	-0.06	0.05	0.42	-0.03	-0.07	-0.01	0.22	1.00						
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.13]	[0.00]							
Log Age [11]	0.00	0.03	-0.14	0.00	0.21	-0.14	-0.11	-0.07	0.36	0.41	1.00					
	[0.78]	[0.00]	[0.00]	[0.57]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]						
Expense [12]	-0.06	-0.02	0.32	0.03	-0.25	0.07	0.09	0.01	-0.07	-0.28	-0.07	1.00				
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.15]	[0.00]	[0.00]	[0.00]					
Log Turnover [13]	-0.03	0.00	0.10	0.03	-0.02	0.12	0.01	0.04	-0.19	-0.12	-0.09	0.18	1.00			
	[0.00]	[0.53]	[0.00]	[0.00]	[0.00]	[0.00]	[0.03]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]				
Net Flows [14]	-0.01	0.00	0.01	0.00	-0.06	0.00	0.04	0.02	-0.15	-0.09	-0.37	0.02	0.04	1.00		
	[0.17]	[0.59]	[0.17]	[0.51]	[0.00]	[0.66]	[0.00]	[0.01]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]			
Perf. Adv. Fee [15]	0.00	-0.01	0.10	0.04	0.08	-0.01	0.02	-0.07	-0.04	0.08	0.02	0.00	0.07	-0.03	1.00	
	[0.58]	[0.25]	[0.00]	[0.00]	[0.00]	[0.07]	[0.01]	[0.00]	[0.00]	[0.00]	[0.01]	[0.70]	[0.00]	[0.00]		
Coles Inc. Rate [16]	0.01	-0.01	0.05	-0.02	-0.18	0.05	0.06	-0.07	-0.10	-0.28	-0.25	0.05	0.12	0.08	-0.01	1.00
	[0.44]	[0.13]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.31]	

Table 3

Performance Pay and Fund Performance

This table reports the results of regressions of fund abnormal performance on performance-based compensation. *Performance Pay* is a dummy variable that is set to 1 if the manager's bonus is tied to the investment performance of the fund, zero otherwise. Mutual fund abnormal performance is measured by *Benchmark-adjusted Alpha*, in columns (1) to (3), and *Six-factor Alpha*, in columns (4) to (6). All independent variables are defined as in Tables I and II. Standard errors are clustered at the advisor level. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. *t-statistics* are in parentheses.

	Benchmark-adj. Alpha$_t$			***Six-factor Alpha$_t$***		
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
Performance Pay$_{t-1}$	0.397**	0.662***	0.402**	0.734***	0.558***	0.555***
	(2.18)	(3.70)	(2.20)	(4.38)	(3.19)	(3.10)
Log Advisor Size $_{t-1}$		0.019	0.053**		0.031**	0.026
		(1.20)	(2.29)		(1.98)	(1.47)
Subadviser $_{t-1}$		-0.247*	0.216		-0.202	-0.223*
		(-1.90)	(1.43)		(-1.61)	(-1.66)
Owner $_{t-1}$		0.503***	0.501***		0.493***	0.543***
		(2.80)	(2.71)		(2.79)	(2.93)
Team Mgmt. $_{t-1}$		-0.155	-0.104		-0.136	-0.095
		(-1.56)	(-0.84)		(-1.43)	(-0.84)
Log Manager Tenure $_{t-1}$		0.077	0.028		0.049	0.013
		(1.50)	(0.47)		(0.93)	(0.22)
Log Fund Size $_{t-1}$		0.094***	-0.054*		0.058**	0.079**
		(3.19)	(-1.73)		(2.11)	(2.34)
Log Fund Age $_{t-1}$		-0.058	0.010		-0.045	-0.070
		(-0.78)	(0.14)		(-0.64)	(-0.87)
Expense$_{t-1}$		0.100	-0.473***		-0.012	0.110
		(0.61)	(-4.41)		(-0.08)	(0.64)
Log Turnover $_{t-1}$		0.061	-0.151***		0.055	0.044
		(1.14)	(-2.61)		(1.04)	(0.76)
Ben.-adj. Alpha $_{t-1}$		0.110***	0.065***			
		(8.83)	(5.21)			
Six-factor Alpha $_{t-1}$					0.161***	0.161***
					(12.34)	(10.56)
Net Flows $_{t-1}$		-0.053	0.054		-0.033	-0.082
		(-0.98)	(1.41)		(-0.61)	(-1.62)
Total Risk $_{t-1}$		-0.011	-0.016		-0.008	-0.006
		(-0.77)	(-1.59)		(-0.50)	(-0.36)
Perf. Adv. Fee $_{t-1}$			-0.375			-0.676
			(-0.49)			(-0.85)
Coles Incentive Rate $_{t-1}$			0.364*			0.190
			(1.68)			(0.89)
Constant	0.033	-2.077***	0.438	-0.386**	-1.625***	-1.302**
	(0.20)	(-3.59)	(0.85)	(-2.56)	(-2.77)	(-2.19)

Category Dummies	No	Yes	Yes	No	Yes	Yes
Year Dummies	No	Yes	Yes	No	Yes	Yes
Observations	22,235	20,683	18,056	21,766	19,763	16,716
R-squared	0.00	0.06	0.02	0.00	0.08	0.07

Table 4

Portfolio Manager Compensation Structures and Fund Performance

This table presents estimations of the impact of various compensation structures on fund abnormal performance. Panel A reports univariate analysis, which compares the abnormal performance of groups that receive, respectively, performance-based, AUM-based, advisor-profits-based, and fixed salary with groups that do not receive such compensation. We perform *t*-tests on the mean between the two groups and the reported *t-statistics* are clustered at the advisor level. Panel B reports the ordinary least squares estimation of various compensation structures (i.e., performance-based, AUM-based, advisor-profits-based, and fixed salary) on fund abnormal performance measured by *Benchmark-adjusted Alpha* in columns (1) to (3), and *Six-factor Alpha* in columns (4) to (6). All independent variables are defined as in Tables I and II. Standard errors are clustered at the advisor level. We perform pair *F*-test on the coefficients of various compensation structures and report the point estimation of these coefficients that are significantly different from each other at the bottom of the table. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. *t-statistics* are in parentheses and *p*-values are in brackets.

Panel A: Univariate Analysis

	Performance Pay = 1			***Performance Pay = 0***				
	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Diff.	t-stat.
Benchmark-adj. Alpha	0.430	4.75	17,194	0.033	5.88	5,041	0.397**	(2.18)
Six-factor Alpha	0.348	5.53	16,828	-0.386	6.102	4,938	0.734***	(4.38)
	AUM Pay = 1			***AUM Pay = 0***				
	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Diff.	t-stat.
Benchmark-adj. Alpha	0.158	5.09	4,265	0.383	5.02	17,970	-0.225	(-1.42)
Six-factor Alpha	0.145	5.53	4,163	0.191	5.707	17,603	-0.046	(-0.32)
	Advisor-Profits Pay = 1			***Advisor-Profits Pay = 0***				
	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Diff.	t-stat.
Benchmark-adj. Alpha	0.305	5.20	11,429	0.377	4.85	10,806	-0.072	(-0.48)
Six-factor Alpha	0.056	5.54	11,139	0.314	5.80	10,627	-0.258*	(-1.90)
	Fixed Salary = 1			***Fix Salary = 0***				
	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Diff.	t-stat.
Benchmark-adj. Alpha	-0.380	5.74	725	0.364	5.00	21,510	-0.744**	(-2.40)
Six-factor Alpha	-0.844	5.70	695	0.216	5.67	21,071	-1.060***	(-3.15)

Panel B: Multivariate Analysis

	Benchmark-adj. Alpha$_t$			***Six-factor Alpha$_t$***		
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
Performance Pay$_{t-1}$	0.378*	0.653***	0.433**	0.644***	0.593***	0.577***
	(1.92)	(3.27)	(2.26)	(3.48)	(3.07)	(2.96)
AUM Pay$_{t-1}$	-0.304*	-0.193	-0.239	-0.169	-0.187	-0.167
	(-1.90)	(-1.51)	(-1.64)	(-1.25)	(-1.52)	(-1.23)
Advisor-Profits Pay $_{t-1}$	-0.007	-0.155	0.067	-0.157	-0.184*	-0.118
	(-0.05)	(-1.31)	(0.51)	(-1.25)	(-1.69)	(-0.98)
Fixed Salary $_{t-1}$	-0.507	-0.368	-0.165	-0.631*	-0.048	-0.129
	(-1.51)	(-1.02)	(-0.53)	(-1.70)	(-0.14)	(-0.37)
Log Advisor Size $_{t-1}$		0.012	0.052**		0.025	0.023
		(0.79)	(2.23)		(1.64)	(1.30)
Subadviser $_{t-1}$		-0.236*	0.209		-0.182	-0.214
		(-1.82)	(1.41)		(-1.47)	(-1.62)
Owner $_{t-1}$		0.553***	0.481***		0.577***	0.588***
		(3.02)	(2.63)		(3.32)	(3.19)
Team Mgmt. $_{t-1}$		-0.148	-0.104		-0.125	-0.101
		(-1.50)	(-0.85)		(-1.33)	(-0.90)
Log Manager Tenure $_{t-1}$		0.080	0.027		0.051	0.011
		(1.52)	(0.45)		(0.95)	(0.18)
Log Fund Size $_{t-1}$		0.091***	-0.056*		0.057**	0.079**
		(3.08)	(-1.83)		(2.03)	(2.34)
Log Fund Age $_{t-1}$		-0.056	0.013		-0.044	-0.065
		(-0.76)	(0.18)		(-0.63)	(-0.81)
Expense$_{t-1}$		0.110	-0.459***		-0.009	0.115
		(0.68)	(-4.30)		(-0.06)	(0.66)
Log Turnover $_{t-1}$		0.065	-0.150**		0.059	0.047
		(1.19)	(-2.58)		(1.09)	(0.79)
Ben.-adj. Alpha $_{t-1}$		0.110***	0.065***			
		(8.82)	(5.21)			
Six-factor Alpha $_{t-1}$					0.161***	0.161***
					(12.32)	(10.56)
Net Flows $_{t-1}$		-0.057	0.052		-0.036	-0.085*
		(-1.06)	(1.37)		(-0.68)	(-1.66)
Total Risk $_{t-1}$		-0.012	-0.017		-0.009	-0.007
		(-0.84)	(-1.64)		(-0.56)	(-0.42)
Performance Adv. Fee $_{t-1}$			-0.423			-0.672
			(-0.55)			(-0.84)
Coles Incentive Rate $_{t-1}$			0.357			0.223
			(1.64)			(1.06)
Constant	0.126	-1.915***	0.437	-0.183	-1.510**	-1.212**
	(0.66)	(-3.31)	(0.85)	(-0.96)	(-2.58)	(-2.02)
Category Dummies	No	Yes	Yes	No	Yes	Yes
Year Dummies	No	Yes	Yes	No	Yes	Yes
Observations	22,235	20,683	18,056	21,766	19,763	16,716
R-squared	0.00	0.06	0.02	0.00	0.08	0.07

F-test						
Per. Pay = Fix	0.885***	1.021**	0.598*	1.275***	0.641**	0.706**
	[0.005]	[0.04]	[0.06]	[0.00]	[0.05]	[0.04]
Per. Pay = AUM Pay	0.682**	0.846***	0.672**	0.813***	0.780***	0.744***
	[0.02]	[0.008]	[0.01]	[0.00]	[0.00]	[0.00]
Per. Pay = Profit Pay	0.386*	0.808*	0.366	0.801***	0.777***	0.695***
	[0.09]	[0.05]	[0.11]	[0.00]	[0.00]	[0.00]

Table 5

Evaluation Period and Fund Performance

This table presents estimations of the impact of evaluation period on fund abnormal performance. We include only sample funds that report evaluation period (14,779 fund–year observations) in the SAI as well as a subset of funds that report the evaluation period and clearly state a benchmark against which fund performance is evaluated (11,760 fund–year observations). Panel A reports univariate analyses in which we sort sample funds into groups based on the evaluation period and perform *t*-tests on the mean performance between groups. Panel B reports the ordinary least squares estimation of evaluation period on fund abnormal performance measured by *Benchmark-adjusted Alpha*, in columns (1) to (3), and *Six-factor Alpha*, in columns (4) to (6). Panel C repeats the estimations in Panel B including only funds that report the evaluation period together with a clearly stated benchmark. All independent variables are defined as in Tables I and II. Standard errors are clustered at the advisor level. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. *t-statistics* are in parentheses.

Panel A: Univariate Analysis

A1. All Funds

	Eval. Period Mean	***Benchmark-adj. Alpha$_t$***			***Six-factor Alpha$_t$***		
Group		***Mean***	***Std. Dev.***	***Obs.***	***Mean***	***Std. Dev.***	***Obs.***
1	1.9	0.312	4.48	5,141	0.203	5.05	5,049
2	3.0	0.484	4.59	6,545	0.442	5.48	6,451
3	5.0	0.802	5.06	2,924	0.691	6.28	2,857
Diff. (1-2)		-0.172**			-0.239**		
		(-2.03)			(-2.41)		
Diff. (2-3)		-0.318***			-0.249*		
		(-3.02)			(-1.93)		
Diff. (1-3)		-0.490***			-0.488***		
		(-4.50)			(-3.77)		

A2. Funds with A Clearly Stated Benchmark

	Eval. Period Mean	***Benchmark-adj. Alpha$_t$***			***Six-factor Alpha$_t$***		
Group		***Mean***	***Std. Dev.***	***Obs.***	***Mean***	***Std. Dev.***	***Obs.***
1	1.9	0.116	4.58	3,516	0.094	5.26	3,487
2	3.0	0.395	4.45	5,390	0.405	5.41	5,325
3	5.0	0.943	4.95	2,711	0.769	6.15	2,660
Diff. (1-2)		-0.279***			-0.311***		
		(-2.85)			(-2.67)		
Diff. (2-3)		-0.548***			-0.364***		
		(-5.03)			(-2.67)		
Diff. (1-3)		-0.827***			-0.674***		
		(-6.82)			(-4.55)		

Panel B: Multivariate Analysis—All Funds

Variables	*Benchmark-adj. Alpha$_t$*			*Six-factor Alpha$_t$*		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Evaluation Period$_{t-1}$	0.185**	0.163*	0.139	0.197***	0.162**	0.182*
	(2.30)	(1.92)	(1.27)	(3.06)	(2.40)	(1.88)
Log Advisor Size $_{t-1}$		0.020	0.031		0.008	-0.003
		(0.79)	(1.19)		(0.37)	(-0.13)
Subadviser $_{t-1}$		0.095	0.108		-0.351**	-0.406**
		(0.62)	(0.66)		(-2.23)	(-2.47)
Owner $_{t-1}$		0.377	0.309		0.407	0.365
		(1.33)	(1.12)		(1.55)	(1.27)
Team Mgmt. $_{t-1}$		0.031	0.020		0.008	-0.002
		(0.21)	(0.14)		(0.07)	(-0.02)
Log Manager Tenure $_{t-1}$		0.062	0.116		0.092	0.054
		(1.05)	(1.60)		(1.54)	(0.77)
Log Fund Size $_{t-1}$		-0.077***	-0.065*		0.073**	0.100**
		(-2.64)	(-1.70)		(2.37)	(2.32)
Log Fund Age $_{t-1}$		0.015	0.015		-0.027	-0.090
		(0.22)	(0.20)		(-0.33)	(-0.99)
Expense$_{t-1}$		-0.550***	-0.427**		0.298**	0.452**
		(-4.17)	(-2.58)		(1.98)	(2.56)
Log Turnover $_{t-1}$		-0.079	-0.121*		0.082	0.071
		(-1.34)	(-1.94)		(1.29)	(0.92)
Ben.-adj. Alpha $_{t-1}$		0.029*	0.026*			
		(1.93)	(1.72)			
Six-factor Alpha $_{t-1}$					0.161***	0.155***
					(13.05)	(10.52)
Total Risk $_{t-1}$		0.097**	0.111**		0.051	-0.009
		(2.23)	(2.33)		(0.91)	(-0.18)
Net Flows $_{t-1}$		-0.017	-0.017		-0.029	-0.030
		(-1.56)	(-1.34)		(-1.41)	(-1.37)
Performance Adv. Fee $_{t-1}$			-1.581**			-1.571*
			(-2.31)			(-1.72)
Coles Incentive Rate $_{t-1}$			0.353			0.045
			(1.30)			(0.17)
Constant	-0.070	0.455	0.142	-0.186	-2.571***	-1.999***
	(-0.29)	(0.77)	(0.22)	(-0.84)	(-3.77)	(-2.80)
Category Dummies	No	Yes	Yes	No	Yes	Yes
Year Dummies	No	Yes	Yes	No	Yes	Yes
Observations	14,610	14,122	11,273	14,357	13,287	10,621
R-squared	0.00	0.01	0.01	0.00	0.09	0.08

Panel C: Multivariate Analysis—Funds with Clearly Stated Benchmark

Variables	***Benchmark-adj. Alpha$_t$***			***Six-factor Alpha$_t$***		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Evaluation Period$_{t-1}$	0.290***	0.282***	0.295***	0.237***	0.189**	0.226**
	(3.56)	(3.51)	(2.94)	(3.26)	(2.44)	(2.09)
Log Advisor Size $_{t-1}$		0.015	0.031		0.007	-0.010
		(0.56)	(1.13)		(0.27)	(-0.29)
Subadviser $_{t-1}$		0.105	0.121		-0.187	-0.268
		(0.63)	(0.70)		(-1.21)	(-1.62)
Owner $_{t-1}$		0.343*	0.198		0.049	-0.010
		(1.88)	(1.03)		(0.28)	(-0.05)
Team Mgmt. $_{t-1}$		0.165	0.144		0.087	0.101
		(1.05)	(0.97)		(0.65)	(0.64)
Log Manager Tenure $_{t-1}$		0.113	0.179*		0.117*	0.098
		(1.58)	(1.97)		(1.70)	(1.12)
Log Fund Size $_{t-1}$		-0.087***	-0.067		0.070**	0.090*
		(-2.64)	(-1.47)		(2.12)	(1.87)
Log Fund Age $_{t-1}$		0.047	0.045		-0.009	-0.074
		(0.61)	(0.50)		(-0.09)	(-0.70)
Expense$_{t-1}$		-0.671***	-0.573***		0.088	0.209
		(-4.57)	(-3.06)		(0.59)	(1.15)
Log Turnover $_{t-1}$		-0.094	-0.144**		0.049	0.032
		(-1.55)	(-2.21)		(0.67)	(0.36)
Ben.-adj. Alpha $_{t-1}$		0.022	0.018			
		(1.42)	(1.01)			
Six-factor Alpha $_{t-1}$					0.162***	0.157***
					(12.45)	(9.80)
Total Risk $_{t-1}$		0.049	0.069		0.063	-0.009
		(1.14)	(1.35)		(0.99)	(-0.14)
Net Flows $_{t-1}$		-0.014	-0.016		-0.025	-0.030
		(-1.13)	(-1.23)		(-1.06)	(-1.24)
Performance Adv. Fee $_{t-1}$			-1.250*			-1.477**
			(-1.84)			(-2.02)
Coles Incentive Rate $_{t-1}$			0.410			-0.080
			(1.24)			(-0.25)
Constant	-0.471*	0.114	-0.326	-0.347	-2.608***	-1.932**
	(-1.78)	(0.17)	(-0.45)	(-1.36)	(-3.34)	(-2.35)
Category Dummies	No	Yes	Yes	No	Yes	Yes
Year Dummies	No	Yes	Yes	No	Yes	Yes
Observations	11,617	11,216	8,626	11,472	10,638	8,181
R-squared	0.01	0.01	0.02	0.00	0.09	0.08

Table 6

Portfolio Manager Compensation Structures and Fund Risk

This table presents estimations of the impact of various portfolio manager compensation structures on mutual fund risk-taking. The dependent variable in columns (1) to (3) is *Total Risk*, defined as the standard deviation of monthly net-of-fee returns of a fund in a calendar year. The dependent variable for columns (4) to (6) is the systematic risk measure *Beta*, defined as in Equation (1). All independent variables are defined as in Tables I and II. Standard errors are clustered at the advisor level. We perform pair *F*-test on the coefficients of various compensation structures and report the point estimation of those coefficients that are significantly different from each other at the bottom of the table. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. *t-statistics* are in parentheses and *p*-values are in brackets.

	Total Risk $_t$			***Beta*** $_t$		
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
Fixed Salary $_{t-1}$	-0.135**	-0.151**		-0.025**	-0.021*	
	(-2.32)	(-2.25)		(-2.27)	(-1.81)	
Performance Pay $_{t-1}$		-0.012			0.006	
		(-0.26)			(1.14)	
AUM Pay $_{t-1}$		-0.015			0.003	
		(-0.71)			(0.74)	
Advisor-Profits Pay $_{t-1}$		-0.025			0.001	
		(-1.01)			(0.13)	
Evaluation Period $_{t-1}$			-0.013			-0.004
			(-0.63)			(-1.63)
Log Advisor Size $_{t-1}$	-0.001	-0.001	-0.009	0.001*	0.001	0.001
	(-0.29)	(-0.29)	(-1.64)	(1.75)	(1.49)	(1.21)
Subadviser $_{t-1}$	0.001	0.003	0.011	0.005	0.005	0.009*
	(0.04)	(0.13)	(0.30)	(1.34)	(1.32)	(1.68)
Owner $_{t-1}$	-0.015	-0.012	0.036	-0.004	-0.002	0.011*
	(-0.57)	(-0.31)	(0.82)	(-0.79)	(-0.39)	(1.96)
Team Mgmt. $_{t-1}$	-0.011	-0.011	-0.054*	0.002	0.002	-0.006
	(-0.52)	(-0.53)	(-1.84)	(0.67)	(0.60)	(-1.26)
Log Manager Tenure $_{t-1}$	-0.017	-0.018	-0.014	-0.004*	-0.004*	-0.004
	(-1.30)	(-1.34)	(-0.91)	(-1.88)	(-1.81)	(-1.25)
Log Fund Size $_{t-1}$	0.030***	0.030***	0.030***	0.005***	0.005***	0.005***
	(5.15)	(5.29)	(3.59)	(3.99)	(3.97)	(2.83)
Log Fund Age $_{t-1}$	-0.034***	-0.034**	-0.049***	-0.003	-0.003	-0.002
	(-2.59)	(-2.58)	(-2.76)	(-0.94)	(-0.96)	(-0.41)
Expense $_{t-1}$	0.129***	0.130***	0.243***	0.001	0.001	0.006
	(5.01)	(4.98)	(6.29)	(0.25)	(0.21)	(0.90)
Log Turnover $_{t-1}$	0.016	0.017	0.010	0.001	0.001	0.005*
	(1.24)	(1.27)	(0.70)	(0.54)	(0.43)	(1.80)
Net Return $_{t-1}$	0.004***	0.004***	0.007***	-0.001***	-0.001***	-0.000
	(3.89)	(3.88)	(4.45)	(-3.06)	(-3.09)	(-0.52)
Total Risk $_{t-1}$	0.581***	0.581***	0.540***			
	(36.37)	(36.45)	(37.07)			

Beta $_{t-1}$				0.619***	0.619***	0.585***
				(35.50)	(35.41)	(22.25)
Net Flows $_{t-1}$	0.000	-0.000	-0.002	0.001	0.001	0.001
	(0.04)	(-0.02)	(-0.84)	(1.39)	(1.43)	(1.20)
Perf. Adv. Fee $_{t-1}$	-0.104	-0.101	-0.326***	0.015	0.016	-0.012
	(-0.79)	(-0.78)	(-2.68)	(0.73)	(0.73)	(-1.35)
Coles Incentive Rate $_{t-1}$	-0.036	-0.031	-0.055	-0.004	-0.004	0.004
	(-0.81)	(-0.71)	(-1.10)	(-0.61)	(-0.58)	(0.43)
Constant	1.599***	1.623***	1.800***	0.370***	0.367***	0.388***
	(15.45)	(17.22)	(16.74)	(15.80)	(15.57)	(10.91)
Category Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18,291	18,291	8,717	18,055	18,055	8,625
R-squared	0.84	0.84	0.85	0.42	0.42	0.38
F-test						
Per. Pay = Fix		0.139**			0.027**	
		[0.02]			[0.02]	
AUM Pay = Fix		0.136*			0.024*	
		[0.05]			[0.06]	
Profit Pay = Fix		0.126*			0.022*	
		[0.09]			[0.07]	

Table 7

Portfolio Manager Compensation Structures and Fund Risk Shifting

This table presents estimations of the impact of various portfolio manager compensation structures on mutual fund risk-shifting behavior. This sample includes only diversified U.S. equity funds (8,534 fund–year observations). The dependent variable in columns (1) to (3) is *Risk Shift Ratio*, defined in Equation (2). The dependent variable in columns (4) to (6) is *Risk Shift Diff* as defined in Equation (3). All independent variables are defined in Tables I and II. Standard errors are clustered at the advisor level. We perform pair *F*-test on the coefficients of various compensation structures and report the point estimation of those coefficients that are significantly different from each other at the bottom of the table. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. *t-statistics* are in parentheses and *p*-values are in brackets.

	Risk Shift Ratio$_t$			***Risk Shift Diff$_t$***		
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
Fixed Salary$_{t-1}$	-0.011	-0.022***		-0.037	-0.063**	
	(-1.43)	(-2.83)		(-1.39)	(-2.31)	
Performance Pay$_{t-1}$		-0.019*			-0.046	
		(-1.67)			(-1.56)	
AUM Pay$_{t-1}$		-0.002			-0.000	
		(-0.45)			(-0.01)	
Advisor-Profits Pay$_{t-1}$		-0.006			-0.016	
		(-1.01)			(-1.04)	
Evaluation Period$_{t-1}$			-0.006**			-0.021**
			(-2.24)			(-2.15)
Log Advisor Size$_{t-1}$	0.001**	0.002**	0.001	0.004**	0.005***	0.004
	(1.98)	(2.51)	(0.78)	(2.36)	(2.70)	(1.39)
Subadviser$_{t-1}$	0.004	0.005*	-0.003	0.016	0.019*	-0.008
	(1.17)	(1.73)	(-0.66)	(1.39)	(1.78)	(-0.57)
Owner$_{t-1}$	-0.008*	-0.011**	-0.005	-0.026*	-0.032**	-0.020
	(-1.92)	(-2.15)	(-0.80)	(-1.90)	(-2.05)	(-0.97)
Team Mgmt.$_{t-1}$	-0.011	-0.010	-0.004	-0.031*	-0.029*	-0.016
	(-1.57)	(-1.61)	(-0.58)	(-1.68)	(-1.72)	(-0.74)
Log Manager Tenure$_{t-1}$	-0.002	-0.002	-0.001	-0.003	-0.004	-0.004
	(-0.58)	(-0.71)	(-0.40)	(-0.38)	(-0.49)	(-0.39)
Log Fund Size$_{t-1}$	0.003**	0.004**	0.002	0.010**	0.011**	0.007
	(2.20)	(2.26)	(1.61)	(2.46)	(2.54)	(1.35)
Log Fund Age$_{t-1}$	-0.002	-0.002	-0.003	-0.006	-0.007	-0.014
	(-0.72)	(-0.75)	(-0.95)	(-0.76)	(-0.78)	(-1.41)
Expense$_{t-1}$	0.004	0.004	0.001	0.018	0.019	-0.005
	(0.66)	(0.81)	(0.09)	(1.05)	(1.18)	(-0.19)
Log Turnover$_{t-1}$	0.005	0.006	0.010***	0.024**	0.026***	0.034***
	(1.26)	(1.63)	(3.03)	(2.35)	(2.78)	(3.46)
Net Return$_{t-1}$	-0.001***	-0.001***	-0.001**	-0.003***	-0.003***	-0.002*
	(-4.80)	(-4.69)	(-2.20)	(-4.51)	(-4.46)	(-1.93)
Risk Shift(ratio)$_{t-1}$	0.150**	0.146**	0.051			
	(2.28)	(2.38)	(1.16)			
Risk Shift(diff)$_{t-1}$				0.042	0.039	
				(0.93)	(0.92)	
Net Flows$_{t-1}$	0.001	0.001	0.001	0.002	0.001	0.001
	(1.17)	(1.03)	(0.94)	(0.83)	(0.74)	(0.22)
Performance Fee$_{t-1}$	-0.022***	-0.024***	-0.016*	-0.058*	-0.062*	-0.035

	(-3.43)	(-3.20)	(-1.96)	(-1.75)	(-1.76)	(-1.26)
Coles Incentive Rate $_{t-1}$	0.018**	0.019**	0.005	0.040	0.041	0.005
	(2.06)	(2.05)	(0.81)	(1.59)	(1.62)	(0.22)
Constant	0.877***	0.889***	0.982***	-0.025	-0.004	0.056
	(20.31)	(23.07)	(19.43)	(-0.26)	(-0.04)	(0.76)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,425	6,425	2,939	6,425	6,425	2,939
R-squared	0.19	0.19	0.24	0.22	0.22	0.32
F-test						
Per. Pay = Fix		0.003			0.017	
		[0.79]			[0.59]	
AUM Pay = Fix		0.020**			0.063**	
		[0.02]			[0.04]	
Profit Pay = Fix		0.016**			0.047**	
		[0.04]			[0.04]	

Table 8

Determinants of Portfolio Manager Compensation Structures

This table presents ordinary least squares estimations of the determinants of various portfolio manager compensation structures. Specifically, the dependent variable is *Performance Pay* in column (1), *AUM Pay* in column (2), *Advisor-Profits Pay* in column (3), *Fixed Salary* in column (4), and *Evaluation Period* in (5). All independent variables are defined as in Table II. Standard errors are clustered at the advisor level. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. *t-statistics* are in parentheses.

	Performance Pay$_t$	***AUM Pay$_t$***	***Advisor-Profits Pay$_t$***	***Fixed Salary$_t$***	***Evaluation Period$_t$***
	(1)	***(2)***	***(3)***	***(4)***	***(5)***
Log Advisor Size$_{t-1}$	0.036***	0.004	-0.012*	-0.012***	0.063**
	(4.84)	(0.41)	(-1.76)	(-6.77)	(2.24)
Subadviser$_{t-1}$	0.020	0.011	0.082*	-0.015	0.141
	(0.37)	(0.15)	(1.73)	(-1.13)	(0.76)
Owner$_{t-1}$	-0.364***	-0.016	0.352***	-0.018	-0.136
	(-4.82)	(-0.17)	(6.36)	(-1.29)	(-0.37)
Team Mgmt.$_{t-1}$	0.051	0.006	-0.043	-0.016	0.022
	(1.42)	(0.14)	(-1.01)	(-1.31)	(0.16)
Log Manager Tenure$_{t-1}$	-0.022*	-0.013	-0.017	0.006	0.004
	(-1.85)	(-0.90)	(-0.87)	(1.22)	(0.14)
Log Fund Size$_{t-1}$	0.012	0.002	0.006	-0.009***	0.074***
	(1.56)	(0.25)	(0.65)	(-2.81)	(3.37)
Log Fund Age$_{t-1}$	-0.005	0.013	0.014	-0.003	-0.091**
	(-0.38)	(0.68)	(0.66)	(-0.56)	(-2.37)
Expense$_{t-1}$	-0.002	0.037	-0.025	0.014	-0.031
	(-0.06)	(1.39)	(-0.81)	(0.88)	(-0.22)
Log Turnover$_{t-1}$	0.015	0.007	0.015	-0.003	-0.124***
	(0.96)	(0.52)	(0.89)	(-0.53)	(-2.74)
Net Flows$_{t-1}$	-0.002	-0.003**	-0.002	-0.001**	-0.002
	(-1.45)	(-2.23)	(-0.83)	(-2.00)	(-0.27)
Performance Adv. Fee$_{t-1}$	-0.062	-0.125*	0.231*	-0.028	-0.332**
	(-0.35)	(-1.94)	(1.68)	(-1.52)	(-2.49)
Coles Incentive Rate$_{t-1}$	-0.044	0.068	0.224**	-0.062*	0.078
	(-0.66)	(0.61)	(2.10)	(-1.65)	(0.44)
Constant	0.511***	0.110	0.533***	0.163***	2.674***
	(4.07)	(0.92)	(4.17)	(3.56)	(5.59)
Category Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Observations	18,348	18,348	18,348	18,348	11,419
R-squared	0.27	0.01	0.12	0.07	0.09

Internet Appendix for
"Portfolio Manager Compensation in the U.S. Mutual Fund Industry"

March 2015

This Internet Appendix (IA) tabulates additional results for some of the empirical tests referred to in the paper.

Table IA.1 Distribution of Portfolio Manager Compensation Structures by Year

This table reports the distribution of compensation structures by year (2006-2011). The sample consists of 22,565 fund–year observations over the period 2006-2011, among which 14,779 report their evaluation period. *Fixed Salary* is an indicator variable that equals 1 if the portfolio manager receives a fixed amount of compensation from the advisor, zero otherwise. *Performance Pay* is a dummy variable that is set to 1 if the bonus is tied to the investment performance of the fund, zero otherwise; *AUM Pay* is an indicator variable that equals 1 if portfolio manager compensation is tied to the fund's assets under management, zero otherwise; *Advisor-Profits Pay* is a dummy variable that is set to 1 if the portfolio manager's compensation depends on the advisor's profits, zero otherwise; *Evaluation Period* is the average number of years over which investment performance is measured for performance-based bonus; most funds report multiple evaluation windows, *Evaluation Period Min* is the shortest evaluation window, *Evaluation Period Max* is the longest evaluation window, and *Evaluation Period Median* is the middle evaluation window. For funds that have multiple reported evaluation windows, we use the mean of *Evaluation Period Min* and *Evaluation Period Max* as *Evaluation Period*.

Panel A. Distribution of Compensation Structures by Year

Year	*Fixed Salary*	*Performance Pay*	*AUM Pay*	*Advisor-Profits Pay*	*# Obs.*
2006	2.9%	79.3%	20.3%	50.3%	3,585
2007	3.8%	78.3%	20.4%	51.6%	3,772
2008	3.0%	77.9%	20.0%	51.1%	3,808
2009	3.2%	77.0%	20.1%	52.3%	3,890
2010	3.1%	75.3%	17.8%	52.5%	3,787
2011	3.5%	74.3%	16.7%	51.3%	3,723
All	3.2%	77.0%	19.2%	51.5%	22,565

Panel B. Summary Statistics of Evaluation Periods by Year

Year	*Evaluation Period*	*Evaluation Period Min*	*Evaluation Period Median*	*Evaluation Period Max*	*# Obs.*
2006	2.952	1.61	3.16	4.29	2,440
2007	2.953	1.64	3.18	4.27	2,543
2008	2.986	1.59	3.16	4.38	2,539
2009	2.994	1.58	3.17	4.40	2,571
2010	3.057	1.66	3.18	4.45	2,376
2011	3.073	1.66	3.20	4.48	2,310
All	3.001	1.62	3.18	4.38	14,779

Table IA.2 Distribution of Portfolio Manager Compensation Structures by Fund Category

This table reports the distribution of compensation structures by fund category. The sample consists of 22,565 fund–year observations over the period 2006-2011, among which 14,779 report their evaluation period. All variables are defined in Table IA.I.

Panel A. Distribution of Compensation Structures by Fund Category

Fund Category	*Fixed Salary*	*Performance Pay*	*AUM Pay*	*Advisor-Profits Pay*	*# Obs.*
Diversified Equity	3.8%	72.8%	20.8%	55.5%	9,159
Sector Funds	0.6%	82.0%	18.3%	42.6%	1,758
Balanced	4.6%	77.8%	14.6%	54.8%	1,771
Bond	3.0%	83.8%	18.7%	49.4%	6,136
Global	2.6%	76.8%	18.8%	46.8%	3,301
Others	5.7%	48.6%	18.4%	57.0%	440
All	3.2%	77.0%	19.2%	51.5%	22,565

Panel B. Summary Statistics of Evaluation Periods by Fund Category

Fund Category	*Evaluation Period*	*Evaluation Period Min*	*Evaluation Period Median*	*Evaluation Period Max*	*# Obs.*
Diversified Equity	3.013	1.62	3.21	4.41	5,519
Sector Funds	3.224	2.17	3.20	4.27	1,261
Balanced	2.713	1.40	2.96	4.03	1,175
Bond	2.871	1.50	3.12	4.24	4,537
Global	3.296	1.71	3.34	4.88	2,123
Others	2.732	1.46	2.87	4.00	164
All	3.001	1.62	3.18	4.38	14,779

Table IA.3 Minimum and Maximum Evaluation Period and Fund Performance

This table presents estimations of the impact of minimum and maximum evaluation periods on fund abnormal performance. Model specifications are identical to columns (3) and (6) in Panel B of Table V. Standard errors are clustered at the advisor level. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. *t-statistics* are in parentheses.

Panel A: Minimum Evaluation Period

	Full Sample		**Subsample with Benchmark**	
	Ben-adj. Alpha$_t$	*Six-factor Alpha*$_t$	*Ben-adj. Alpha*$_t$	*Six-factor Alpha*$_t$
Variables	(1)	(2)	(3)	(4)
Evaluation Period Min$_{t-1}$	-0.046	-0.031	0.016	0.012
	(-0.45)	(-0.30)	(0.14)	(0.10)
Log Advisor Size $_{t-1}$	0.040	0.009	0.049*	0.007
	(1.54)	(0.34)	(1.75)	(0.21)
Subadviser $_{t-1}$	0.122	-0.377**	0.170	-0.218
	(0.73)	(-2.19)	(0.96)	(-1.29)
Owner $_{t-1}$	0.294	0.339	0.096	-0.097
	(1.06)	(1.18)	(0.49)	(-0.54)
Team Mgmt. $_{t-1}$	0.026	0.007	0.132	0.093
	(0.18)	(0.06)	(0.82)	(0.61)
Log Manager Tenure $_{t-1}$	0.116	0.053	0.172*	0.093
	(1.60)	(0.75)	(1.89)	(1.06)
Log Fund Size $_{t-1}$	-0.052	0.116**	-0.045	0.106**
	(-1.37)	(2.57)	(-0.98)	(2.11)
Log Fund Age $_{t-1}$	-0.003	-0.112	0.017	-0.095
	(-0.03)	(-1.20)	(0.19)	(-0.87)
Expense$_{t-1}$	-0.427**	0.444**	-0.596***	0.183
	(-2.56)	(2.52)	(-3.13)	(1.00)
Log Turnover $_{t-1}$	-0.138**	0.047	-0.182**	0.001
	(-2.12)	(0.57)	(-2.51)	(0.01)
Alpha $_{t-1}$	0.027*	0.169***	0.020	0.173***
	(1.76)	(10.95)	(1.17)	(10.64)
Total Risk $_{t-1}$	0.114**	-0.003	0.076	-0.000
	(2.37)	(-0.06)	(1.45)	(-0.00)
Net Flows $_{t-1}$	-0.017	-0.032	-0.017	-0.032
	(-1.31)	(-1.38)	(-1.17)	(-1.25)
Performance Adv. Fee $_{t-1}$	-1.640**	-1.607*	-1.358*	-1.529**
	(-2.37)	(-1.74)	(-1.92)	(-2.02)
Coles Incentive Rate $_{t-1}$	0.363	0.064	0.443	-0.055
	(1.35)	(0.24)	(1.33)	(-0.17)
Constant	0.572	-1.459*	0.495	-1.300
	(0.88)	(-1.96)	(0.67)	(-1.58)
Category Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Observations	11,273	10,621	8,626	8,181
R-squared	0.01	0.08	0.01	0.08

Panel B: Maximum Evaluation Period

	Full Sample		Subsample with Benchmark	
	Ben-adj. Alpha$_t$	*Six-factor Alpha*$_t$	*Ben-adj. Alpha*$_t$	*Six-factor Alpha*$_t$
Variables	(1)	(2)	(3)	(4)
Evaluation Period Max$_{t-1}$	0.103	0.127**	0.195***	0.148**
	(1.62)	(2.50)	(3.27)	(2.57)
Log Advisor Size $_{t-1}$	0.027	-0.008	0.024	-0.015
	(1.02)	(-0.32)	(0.86)	(-0.45)
Subadviser $_{t-1}$	0.088	-0.426***	0.079	-0.296*
	(0.54)	(-2.62)	(0.45)	(-1.78)
Owner $_{t-1}$	0.326	0.379	0.276	0.044
	(1.17)	(1.35)	(1.51)	(0.22)
Team Mgmt. $_{t-1}$	0.024	0.001	0.170	0.117
	(0.18)	(0.01)	(1.18)	(0.75)
Log Manager Tenure $_{t-1}$	0.114	0.050	0.180**	0.096
	(1.58)	(0.71)	(1.98)	(1.11)
Log Fund Size $_{t-1}$	-0.065*	0.099**	-0.066	0.089*
	(-1.73)	(2.35)	(-1.47)	(1.88)
Log Fund Age $_{t-1}$	0.010	-0.103	0.032	-0.090
	(0.13)	(-1.14)	(0.35)	(-0.85)
Expense$_{t-1}$	-0.421**	0.459***	-0.564***	0.218
	(-2.59)	(2.64)	(-3.05)	(1.20)
Log Turnover $_{t-1}$	-0.114*	0.075	-0.136**	0.035
	(-1.80)	(0.98)	(-2.06)	(0.39)
Alpha $_{t-1}$	0.026*	0.168***	0.017	0.172***
	(1.70)	(10.95)	(0.98)	(10.67)
Total Risk $_{t-1}$	0.110**	-0.006	0.068	-0.003
	(2.32)	(-0.12)	(1.35)	(-0.05)
Net Flows $_{t-1}$	-0.017	-0.030	-0.016	-0.030
	(-1.37)	(-1.40)	(-1.28)	(-1.27)
Performance Adv. Fee $_{t-1}$	-1.586**	-1.545*	-1.254*	-1.441*
	(-2.32)	(-1.69)	(-1.86)	(-1.96)
Coles Incentive Rate $_{t-1}$	0.341	0.035	0.396	-0.086
	(1.28)	(0.13)	(1.22)	(-0.27)
Constant	0.137	-1.923***	-0.280	-1.839**
	(0.21)	(-2.78)	(-0.40)	(-2.35)
Category Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Observations	11,273	10,621	8,626	8,181
R-squared	0.01	0.08	0.02	0.08

Table IA.4 Minimum and Maximum Evaluation Periods and Fund Risk

This table presents estimations of the impact of minimum and maximum evaluation periods on fund risk. Model specifications are identical to columns (3) and (6) of Table VI. Standard errors are clustered at the advisor level. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. *t-statistics* are in parentheses.

	Total Risk $_t$		*Beta* $_t$	
Variables	***(1)***	***(2)***	***(3)***	***(4)***
Evaluation Period Min $_{t-1}$	0.009		-0.004	
	(0.65)		(-1.25)	
Evaluation Period Max $_{t-1}$		-0.011		-0.002
		(-0.91)		(-1.23)
Log Advisor Size $_{t-1}$	-0.010*	-0.008	0.001	0.001
	(-1.83)	(-1.50)	(0.92)	(1.19)
Subadviser $_{t-1}$	0.010	0.014	0.007	0.009*
	(0.26)	(0.40)	(1.45)	(1.71)
Owner $_{t-1}$	0.038	0.030	0.013**	0.011**
	(0.97)	(0.67)	(2.44)	(2.02)
Team Mgmt. $_{t-1}$	-0.054*	-0.056*	-0.005	-0.006
	(-1.80)	(-1.92)	(-1.13)	(-1.29)
Log Manager Tenure $_{t-1}$	-0.014	-0.015	-0.004	-0.004
	(-0.88)	(-0.92)	(-1.22)	(-1.24)
Log Fund Size $_{t-1}$	0.029***	0.030***	0.005***	0.005***
	(3.34)	(3.63)	(2.71)	(2.80)
Log Fund Age $_{t-1}$	-0.047***	-0.048***	-0.002	-0.001
	(-2.67)	(-2.77)	(-0.40)	(-0.34)
Expense $_{t-1}$	0.245***	0.242***	0.006	0.006
	(6.26)	(6.28)	(0.94)	(0.90)
Log Turnover $_{t-1}$	0.012	0.009	0.005**	0.005*
	(0.78)	(0.65)	(2.00)	(1.88)
Net Return $_{t-1}$	0.007***	0.007***	-0.000	-0.000
	(4.45)	(4.46)	(-0.55)	(-0.52)
Total Risk $_{t-1}$ ***/ Beta*** $_{t-1}$	0.540***	0.540***	0.585***	0.586***
	(36.89)	(37.46)	(22.28)	(22.29)
Net Flows $_{t-1}$	-0.002	-0.002	0.001	0.001
	(-0.83)	(-0.84)	(1.21)	(1.21)
Perf. Adv. Fee $_{t-1}$	-0.319**	-0.328***	-0.011	-0.012
	(-2.58)	(-2.69)	(-1.23)	(-1.26)
Coles Incentive Rate $_{t-1}$	-0.056	-0.054	0.003	0.004
	(-1.14)	(-1.10)	(0.36)	(0.44)
Constant	1.747***	1.808***	0.382***	0.383***
	(14.27)	(16.81)	(10.84)	(10.96)
Category Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Observations	8,717	8,717	8,625	8,625
R-squared	0.85	0.85	0.38	0.38

Table IA.5 Minimum and Maximum Evaluation Periods and Fund Risk Shifting

This table presents estimations of the impact of minimum and maximum evaluation period on fund risk. Model specifications are identical to columns (3) and (6) of Table VII. Standard errors are clustered at the advisor level. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. *t-statistics* are in parentheses.

	Risk Shift Ratio$_t$		***Risk Shift Diff$_t$***	
Variables	***(1)***	***(2)***	***(3)***	***(4)***
Evaluation Period Min$_{t-1}$	0.002		0.008	
	(0.73)		(0.67)	
Evaluation Period Max$_{t-1}$		-0.005***		-0.016***
		(-2.78)		(-2.74)
Log Advisor Size $_{t-1}$	0.000	0.001	0.002	0.004*
	(0.60)	(1.32)	(1.11)	(1.73)
Subadviser $_{t-1}$	-0.003	-0.002	-0.009	-0.004
	(-0.81)	(-0.42)	(-0.67)	(-0.29)
Owner $_{t-1}$	-0.005	-0.007	-0.016	-0.024
	(-0.89)	(-1.19)	(-0.79)	(-1.30)
Team Mgmt. $_{t-1}$	-0.003	-0.003	-0.015	-0.015
	(-0.56)	(-0.55)	(-0.76)	(-0.74)
Log Manager Tenure $_{t-1}$	-0.001	-0.001	-0.005	-0.003
	(-0.50)	(-0.29)	(-0.53)	(-0.32)
Log Fund Size $_{t-1}$	0.001	0.002	0.004	0.006
	(1.05)	(1.40)	(0.85)	(1.17)
Log Fund Age $_{t-1}$	-0.002	-0.002	-0.010	-0.011
	(-0.66)	(-0.71)	(-1.09)	(-1.13)
Expense$_{t-1}$	0.002	-0.000	-0.000	-0.007
	(0.21)	(-0.05)	(-0.00)	(-0.30)
Log Turnover $_{t-1}$	0.011***	0.009***	0.036***	0.032***
	(3.18)	(2.90)	(3.50)	(3.18)
Net Return $_{t-1}$	-0.001**	-0.001**	-0.002*	-0.002*
	(-2.26)	(-2.20)	(-1.97)	(-1.93)
Risk Shift $_{t-1}$	0.055	0.049	-0.006	-0.011
	(1.21)	(1.13)	(-0.17)	(-0.34)
Net Flows $_{t-1}$	0.001	0.001	0.000	0.001
	(0.93)	(1.00)	(0.14)	(0.25)
Perf. Adv. Fee $_{t-1}$	-0.012	-0.017**	-0.022	-0.037
	(-1.58)	(-2.02)	(-0.86)	(-1.31)
Coles Incentive Rate $_{t-1}$	0.004	0.005	0.005	0.008
	(0.65)	(0.83)	(0.23)	(0.35)
Constant	0.957***	0.986***	-0.016	0.060
	(17.93)	(19.89)	(-0.22)	(0.83)
Year Dummies	Yes	Yes	Yes	Yes
Observations	2,939	2,939	2,939	2,939
R-squared	0.24	0.25	0.33	0.33