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

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ABSTRACT

We study compensation contracts of individual portfolio managers using hand-collected data of over 4,500 U.S. mutual funds. Variations in the compensation structures are broadly consistent with an optimal contracting equilibrium. The likelihood of explicit performance-based incentives is positively correlated with the intensity of agency conflicts, as proxied by the advisor's clientele dispersion, its affiliations in the financial industry, and its ownership structure. Investor sophistication and the threat of dismissal in outsourced funds serve as substitutes for explicit performance-based incentives. Finally, we find little evidence of differences in future performance associated with any particular compensation arrangement.

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Mutual funds are professionally managed investment vehicles that pool money from many investors to purchase securities such as stocks, bonds, and money market instruments. According to the Investment Company Institute, about half of all households in the U.S. invest in mutual funds, and the assets managed by them totaled more than $16 trillion at year-end 2016. 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, however, the literature has focused primarily on the design of the advisory contracts between fund investors and investment advisors (i.e., asset management companies).[1] Thus, little is known about the compensation contracts of the actual decision makers – individual portfolio managers hired by advisors to manage the fund 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).[2] 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. In this paper, we analyze this mandatorily disclosed information to enhance our understanding of managerial incentives in the U.S. mutual fund industry and to test predictions from models on portfolio delegation and contract design.

We hand-collect information on portfolio manager compensation structures from the SAIs for a sample of over 4,500 U.S. open-end mutual funds over the period 2006 to 2011. We uncover the following stylized facts. First, almost all of our sample funds report that their portfolio managers receive variable bonus-type compensation as opposed to fixed salary. Second, the bonus component of compensation is explicitly tied to the fund's investment performance for 79.0% of sample funds. The performance evaluation window ranges from one quarter to 10 years, with the average evaluation window equal to three years. Third, we find that for about half of the sample, the manager's bonus is directly linked to the overall profitability of the advisor. Fourth, only 19.6% of sample funds explicitly mention that the advisor considers the fund's AUM when deciding

[1] See, for example, Starks (1987), Grinblatt and Titman (1989), Golec (1992), Tufano and Sevick (1997), Coles, Suay, and Woodbury (2000), Deli (2002), Das and Sundaram (2002), Elton, Gruber, and Blake (2003), Golec and Starks (2004), Dass, Massa, and Patgiri (2008), Massa and Patgiri (2009), and Warner and Wu (2011).

[2] See SEC Rule S7-12-04, Disclosure Regarding Portfolio Managers of Registered Management Investment Companies, http://www.sec.gov/rules/final/33-8458.htm.

manager bonuses. Finally, we find that deferred compensation is present in almost 30% of the sample funds.

Incentives based on fund performance, AUM, and the advisor's profits are not necessarily mutually exclusive. Out of the observations that include variable compensation, 36.1% offer managers a bonus based only on investment performance; 14.5% offer a bonus based only on the advisor's profits, and only 0.9% offer a bonus based exclusively on AUM. For the remaining sample funds, managers receive some combination of the three types of bonus. For instance, in 11.3% of cases managers receive all three types of bonus simultaneously. These stylized facts contrast with the evidence on advisory contracts in the U.S., where AUM-based advisory fees are the predominant structure and performance-based compensation is rarely observed (e.g., Elton, Gruber, and Blake (2003)).

Even though the SEC does not require funds to disclose the relative weights of potential bonuses (i.e., maximum bonus opportunity) and base salary, half of our sample funds voluntarily release such information. While some funds report a quantitative ratio of bonus over base salary, others describe it in qualitative terms. Among the funds that disclose quantitative information, about 35% of them report a bonus-to-salary ratio greater than 200%; about 70% report a ratio greater than or equal to 100%. For those funds that disclose qualitative information, about half claim that the bonus incentive is greater than base salary, while the other half mention that the bonus can be a significant part of total compensation. These findings suggest that variable bonus incentives play a significant role in portfolio manager compensation in the U.S. mutual fund industry.

Having documented compensation patterns at the descriptive level, we next study the determinants of compensation structures of portfolio managers. An extensive theoretical and empirical literature since Holmstrom (1979) studies managerial compensation contracts, especially performance-based incentives. Our unique data allow us to analyze for the first time the heterogeneity in the design of portfolio manager compensation in the U.S. mutual fund industry using a rich set of advisor-, manager-, and fund-level variables proposed in the literature. In particular, our empirical analyses test three broad hypotheses.

Our first hypothesis states that performance-based contracts are costly to implement and emerge as optimal only when agency conflicts are severe enough (e.g., Starks (1987), Grinblatt and Titman (1989), Li and Tiwari (2009), and Cuoco and Kaniel (2011)). We find strong and robust support for this prediction. In particular, performance-based pay is more likely when (i) the advisor has a more disperse clientele and is arguably more likely to engage in cross-clientele subsidization

(e.g., Gaspar, Massa, and Matos (2006)); (ii) the advisor is affiliated with a bank or a broker-dealer and hence is more prone to make decisions that enhance the value of the bank or the broker rather than fund performance (e.g., Ferreira, Matos, and Pires (2018)); or (iii) the portfolio manager is not the founder or a significant stakeholder of the advisor, that is, in the absence of the incentive alignment induced by ownership (e.g., Jensen and Meckling (1976)). We find similar evidence regarding deferred compensation. In particular, compensation is more likely to be deferred when the intensity of agency conflicts is higher. This is consistent with the interpretation of deferred compensation as an instrument that alleviates the myopic behavior of portfolio managers and aligns their long-term objectives with those of fund investors.

Our second hypothesis states that alternative mechanisms make explicit contract incentives redundant. We consider the following four mechanisms: (i) sophisticated investors could presumably be associated with better monitoring skills (e.g., Evans and Fahlenbrach (2012)); (ii) fund ownership by portfolio managers could serve as an incentive alignment mechanism (e.g., Khorana, Servaes, and Wedge (2007)); (iii) the flow-performance relation may work as a disciplining mechanism (e.g., Chen, Goldstein, and Jiang (2008)); and (iv) external subadvisors of outsourced funds may be subject to a higher threat of dismissal for underperformance (e.g., Chen et al. (2013)). We find mixed evidence in support of this hypothesis. On the one hand, the results support the view that investor sophistication, market discipline via the flow-performance relation, and the threat of dismissal in outsourced funds serve as substitutes for explicit performance-based incentives. On the other hand, we do not find evidence of the substitution effect for managerial fund ownership.

In our third set of tests, we examine whether portfolio manager characteristics are related to the design of compensation contracts. In particular, we test the following predictions: (i) performance-based incentives are more prevalent for managers with longer industry experience as they are less affected by career concerns (e.g., Chevalier and Ellison (1999)); (ii) performance-based contracts are less frequently observed for portfolio managers who manage multiple funds since they are likely to create conflicts of interest across funds; (iii) performance-based pay is more likely to be used in teams as it can restore efficiency in managers' effort decision (Holmstrom (1982)); and (iv) pay based on advisor-profit is more likely to be used in cities with greater competition for managerial talent for retention purposes (e.g., Oyer (2004)). We find limited support for this hypothesis. In particular, we do not find evidence of managerial industry experience, the number of funds managed, or team management having a significant impact on the likelihood of adopting performance-based pay. However, as predicted, advisors in cities with

greater competition as proxied by total city AUM (excluding the AUM of the advisor itself) tend to use advisor-profit-based incentives more often.

Our determinant analysis suggests that portfolio manager compensation contracts are designed to mitigate agency conflicts in the absence of alternative monitoring mechanisms, which is broadly consistent with an optimal contracting equilibrium. We conduct two additional tests to assess the robustness of our findings. First, we use simulations to show that our results are not spurious. In the simulations, we repeat the determinants analysis with randomly assigned compensation structures and find that all of the significant relations between the determinant variables and the actual compensation structures turn insignificant. This result suggests that our data do capture meaningful information about portfolio manager compensation. Second, we conduct the determinant analysis over a subsample of funds with changes in the advisory firm (either the advisor or the subadvisor). We find similar evidence as our baseline results.

Next, we examine the determinants of the length of the evaluation period for the subset of contracts with performance-based pay. We find that portfolio managers' performance evaluation period is positively related to fund investors' investment horizon and that portfolio managers in team-managed funds are evaluated over shorter periods. In contrast, the evaluation period is unrelated to funds' portfolio turnover, tracking error volatility, or managerial industry experience. We also find that larger families and families with higher asset growth tend to use longer evaluation periods.

Our last set of tests analyze whether portfolio manager compensation contracts are related to future fund performance or mutual fund fees. First, we find little evidence of future performance difference (gross or net of fees) associated with any particular compensation arrangement (including performance-based pay) after controlling for a comprehensive list of advisor, fund, and portfolio manager variables used in the determinant analysis. This result is again consistent with an optimal contracting equilibrium. Second, we find that performance-based contracts are associated with higher fund advisory fees (in both percentage and dollar value terms). For funds that operate in an environment with high potential for agency conflicts, advisors optimally choose to compensate portfolio managers with explicit performance-based contacts, which are costly and require charging higher advisory fees. These funds make up for the advisory fee disadvantage by charging lower marketing and distribution fees. The two effects offset each other, resulting in no difference in total fund fees for investors across compensation contracts with and without performance-based pay.

Our paper contributes to the vast literature on managerial incentives in the asset management industry. To the best of our knowledge, this paper is the first to systematically analyze the compensation of individual portfolio managers in the U.S. mutual fund industry.[3] The literature has thus far focused on advisory contracts between fund shareholders and investment advisors (see footnote 1). Our paper shifts the focus to within investment advisors and studies the compensation structures of individual portfolio managers, an area that is critical to understanding managerial incentives in the mutual fund industry.

It is well documented that explicit performance-based incentives rarely exist in advisory contracts (e.g., Elton, Gruber, and Blake (2003) and Golec and Starks (2004)), likely due to the fact that advisory contracts are prohibited from having asymmetric incentive fees. In the meanwhile, an extensive literature studies the implicit incentives embedded in the convex relationship between fund flows and performance.[4] These observations seem to indicate that the U.S. mutual fund industry relies mainly on implicit flow incentives to induce managerial effort. In contrast to this view, however, we show that, as predicted by agency theory (e.g., Li and Tiwari (2009)), explicit, asymmetric, performance-based incentive contracts exist in the U.S. mutual fund industry. In particular, we find that, in a less regulated setting, explicit performance-based incentives are the dominant form of compensation for portfolio managers, with such incentives used to address agency conflicts in the absence of alternative mechanisms. Even though incentives based on the fund's AUM or the advisor's profit can be indirectly related to fund performance, our study shows that the factors underlying the design of those incentives are different from the factors driving explicit performance-based incentives in the compensation contract. Those findings can provide guidance to theoretical models on portfolio delegation in the asset management industry (e.g., Cuoco and Kaniel (2011), Basak and Pavlova (2013), Buffa, Vayanos, and Woolley (2014), Koijen (2014), Breugem and Buss (2018), and Sotes-Paladino and Zapatero (2018)).

Our study provides new insights into the heterogeneity of portfolio manager compensation contracts. Our findings suggest that the variation in the compensation structure of portfolio managers is broadly consistent with an optimal contracting equilibrium. Our evidence is largely in

[3] 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. Recent work by Ibert et al. (2018) studies the compensation of mutual fund managers in Sweden. Different from us, they do not observe the heterogeneity in compensation contracts across portfolio managers. In addition, the U.S. mutual fund industry we analyze is much larger, more representative, and subject to different regulations.

[4] See, for example, Brown, Harlow, and Starks (1996), Chevalier and Ellison (1997), Sirri and Tufano (1998), Basak, Pavlova, and Shapiro (2007, 2008), Huang, Wei, and Yan (2007), and Sialm, Starks, and Zhang (2015).

line with Almazan et al. (2004) and Chen, Goldstein, and Jiang (2008), who apply the optimal contracting view to understand the determinants of mutual fund investment constraints and directors' ownership in mutual funds, respectively. Like these papers, we find that compensation contract features fail to predict future performance. Our paper is also related to many empirical studies on performance-based contracts in the executive compensation literature (see Edmans, Gabaix, and Jenter (2017) for a recent survey). For instance, using data based on a new SEC disclosure rule in 2006, De Angelis and Grinstein (2015) find evidence consistent with optimal contracting theory in the use of performance-based incentives in CEO compensation contracts in S&P 500 firms. Our paper also makes a unique contribution by providing evidence on the performance evaluation period of mutual fund managers. While it is not uncommon for prior literature to assume that mutual fund managers are evaluated based on their annual performance, we document that the most prevalent performance evaluation window is three years.

The remainder of this paper proceeds as follows. Section I discusses the institutional background. Section II presents the data, describes compensation variable construction, and reports sample descriptive statistics. Section III provides evidence on the determinants of compensation structures, and Section IV presents results on the determinants of the performance evaluation period. In Section V, we study whether compensation structures are related to future fund performance and fund fees. Section VI concludes.

I. 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, elect the board of directors that represents their interests. The board of directors is legally empowered to govern the fund. Its primary responsibility is to monitor the investment advisor (i.e., the asset management company), including reviewing and approving the advisory contract for the fund's management. Portfolio managers, who are employees of the investment advisor, make the day-to-day investment decisions for the fund. Selection, compensation, and removal of portfolio managers occur mostly at the advisor's discretion.

Investment advisors are compensated 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 (TNA) (e.g., Deli (2002), Elton, Gruber, and Blake (2003), Golec and Starks (2004)). Only a small proportion (less than 5% in our sample) of mutual funds

compensates their investment advisors using incentive fees 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 a 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 restriction.[5]

While the advisory contract between fund shareholders and the investment advisor has been disclosed to 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 portfolio managers' incentives.

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 compensation is fixed, whether (and how) it is based on the fund's pre- or after-tax performance over a certain period, and whether (and how) it 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 to 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, not the dollar value of compensation received by portfolio managers.

[5] The 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."

II. Data, Variables, and Sample Overview

A. Data Sources

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

Our sample covers diversified domestic equity funds, bond funds, asset allocation funds, global funds, sector funds, and funds in miscellaneous categories such as alternative strategy funds. We exclude money market funds and closed-end funds from our sample. We identify and exclude index funds using their names as well as Morningstar and CRSP index fund identifiers.[6] We also exclude funds with multiple investment advisors. Following Elton, Gruber, and Blake (2001), Chen et al. (2004), and Pastor, Stambaugh, and Taylor (2015), we further exclude funds with less than $15 million in TNA. For funds with multiple share classes, we compute fund-level variables by aggregating across the different share classes. 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 retrieve 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 also collect the ownership stake that portfolio managers have in the funds they manage, which is disclosed in seven ranges in the fund's SAI.[7] In addition, we obtain performance-based advisory fee information contained in the N-SAR filings available via EDGAR. The N-SAR data set is then matched by fund ticker and fund name to the Morningstar database.

Finally, we obtain data on investment advisor characteristics contained in Form ADV from the SEC. Form ADV is the form used by investment advisors to register with the SEC. This form

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[6] Similar to Pastor, Stambaugh, and Taylor (2015), we remove funds with Morningstar index fund indicator equal to "Yes." We also exclude from our sample funds whose names contain any of the following text strings: Index, Ind, Idx, Indx, Mkt, Market, Composite, S&P, SP, Russell, Nasdaq, DJ, Dow, Jones, Wilshire, NYSE, iShares, SPDR, HOLDRs, ETF, Exchange-Traded Fund, PowerShares, StreetTRACKS, 100, 400, 500, 600, 1000, 1500, 2000, 3000, and 5000 (e.g., Busse and Tong (2012), Ferson and Lin (2014), Busse, Jiang, and Tang (2017)).

[7] The SEC requires mutual funds to disclose portfolio managers' ownership stakes in the fund using the following seven ranges: $0, $1 to $10,000, $10,001 to 50,000, $50,001 to $100,000, $100,001 to $500,000, $500,001 to $1,000,000, and greater than $1,000,000.

specifies the advisor's business practices, AUM, clientele, number of employees, financial industry affiliations, ownership structure, and other advisor-level characteristics. To match the investment advisors of our sample funds to the sample of advisors that filed Form ADV, we use the fund ticker to obtain the SEC File Number, which is a unique identifier that the SEC assigns in Form ADV to each investment advisor.

B. Construction of Compensation Variables

As discussed above, mutual funds are not required to disclose the actual dollar amount of compensation received by their portfolio managers. Instead, they must disclose only the structure of, and the method used to determine, portfolio manager compensation. To capture the different aspects of portfolio managers' compensation structures, we construct the following variables.

Fixed salary: Portfolio manager compensation can take the form of 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 the indicator variable *Fixed Salary*, which equals one if the portfolio manager's compensation is fixed and zero if it has both a fixed and a variable component.

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

Evaluation period: If compensation is based on the manager's investment performance, 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 capture the evaluation period using two measures: *Evaluation period Min (Max),* which takes the value, in years, of the shortest (longest) evaluation window, and *Evaluation period Mean*, which is calculated as the mean of the shortest and longest evaluation periods.

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

Advisor-profit pay: Similar to *Performance pay* and *AUM pay*, we construct *Advisor-profit pay* as an indicator that takes the value of one if portfolio manager compensation is explicitly tied to overall profits of the investment advisor, and zero otherwise.

Deferred compensation: Investment advisors can also impose a vesting period before a bonus is actually paid to portfolio managers. Sometimes investment advisors add a hurdle condition that must be met in the future before the payment becomes effective. In most cases, the description of deferred compensation in funds' SAI is not detailed enough to quantify the actual amount of deferred compensation. We therefore create the dummy variable *Deferred compensation*, which takes the value of one if the compensation description includes a deferred compensation plan, and zero otherwise.

Note that, except for *Fixed salary*, the variables that describe compensation structures are not necessarily mutually exclusive. Section I of the Internet Appendix provides examples that illustrate how we construct the compensation structure variables based on the SAI information.[8]

C. Sample Overview: Compensation Structures

Our final sample consists of 4,597 unique mutual funds from 479 fund families managed by 744 investment advisors. These sample funds correspond to 20,347 fund-year observations that are evenly distributed over the 2006 to 2011 sample period. The sample distribution across investment objectives is as follows: diversified domestic equity funds (39.2%), bond funds (29.3%), global funds (14.6%), allocation funds (8.0%), and others including sector funds (8.9%).

Table I reports summary statistics on portfolio manager compensation structures at the fund-year level for our sample funds.[9] Panel A shows that fixed salary is rarely observed in the sample: only 1.32% of funds in the full sample claim that their managers' compensation is fixed and does not vary with any factor. In the vast majority of cases, portfolio manager compensation consists of both a fixed base salary and a variable component, that is, a bonus. We find that for 79.04% of our sample funds, portfolio manager compensation is directly linked to fund investment performance. As for the length of the period over which investment performance is measured, the majority of funds report multiple evaluation periods (e.g., one-, three-, and five-year windows). The average evaluation window (reported in Panel B) 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 one quarter.

[Insert Table I here]

Performance-based incentives are asymmetric: advisors reward managers for outperformance relative to a pre-assigned benchmark, but do not equally penalize them for

[8] The Internet Appendix is available in the online version of the article at the *Journal of Finance* website.
[9] See Table IA.I of the Internet Appendix for summary statistics for the diversified domestic equity fund subsample.

underperformance. For example, in describing Victory Value Fund's portfolio manager compensation in 2011, the SAI states that "performance in an upper decile may result in an incentive bonus that is 150% of the target while below-average performance may result in an incentive bonus as low as zero." Contrary to the pattern in advisory contracts, portfolio manager compensation is generally not explicitly tied to the fund's AUM: only 19.61% of funds in our sample explicitly mention that the investment advisor considers the fund's AUM when deciding the bonus in portfolio manager compensation. For 50.89% of our sample funds, portfolio manager compensation is explicitly stated to be linked to the profitability of the investment advisor. The compensation of these portfolio managers is arguably indirectly tied to the fund's AUM and performance, since the advisor's profitability depends on the advisory fee rates and the advisor's total AUM, which also vary with fund performance. Finally, about 30% of the observations in the full sample include some form of deferred compensation.

As mentioned above, incentives based on performance, advisor profits, and AUM are not mutually exclusive. We further break down the distribution based on these three types of bonus in Panel C of Table I. We find that out of the 20,079 fund-year observations that include variable compensation, 36.1% offer managers a bonus based only on investment performance, 14.5% offer a bonus based only on the advisor's profit, and a mere 0.9% offer a bonus based exclusively on AUM. For the remaining funds of the sample, managers receive some combination of the three types of bonus. The combination of *Performance pay* and *Advisor-profit pay* is the most frequent, with 25.4% of fund-year observations. The second most frequent combination, with 11.3% of observations, includes all three types of bonus simultaneously. In the third place is combination of *Performance pay* and *AUM pay*, with 7.3% of observations. The combination of *AUM pay* and *Advisor-profit pay* is quite marginal, with only 0.3% of observations. Finally, in 4.1% of cases, the manager's compensation is entirely subjective and does not depend on any specific stated factor. These statistics speak to the empirical relevance of performance-based bonuses and to the low prevalence of incentives explicitly based on the fund's AUM, both in isolation and in combination with other incentives.

We also collect data on the magnitude of the potential bonus incentive (i.e., maximum annual bonus opportunity) relative to the base salary (hereforth the bonus/salary ratio). Even though the SEC does not require funds to disclose such information, about half of our sample funds (i.e., 11,903 fund-year observations) voluntarily release some information about the relative weights of potential bonuses versus base salary. We report summary statistics in Panel D of Table I. First, we observe quantitative information on the bonus/salary ratio for 1,256 fund-year

observations. Among these observations, we find that 68.3% report that the potential bonus is greater than or equal to the base salary. In a further breakdown, we find that 35.0% of cases have a ratio greater than 200%. Second, we obtain qualitative information on the bonus-to-salary ratio for 10,647 fund-year observations. In approximately half of these observations, the bonus incentive is greater than the base salary. In particular, in 35.6% of cases, the SAI states that the bonus may exceed the base salary, and in 12.5% of cases it states that the bonus could be a multiple of the base salary. In another 47.7% of cases, fund companies disclose that the bonus can be a "significant," "primary," "material," or "substantial" portion of total compensation. In summary, the information we collect about the relative size of bonus versus base salary suggests that bonus incentives play a significant role in portfolio manager compensation in the U.S. mutual fund industry.

If portfolio manager compensation is linked to fund investment performance, the SEC requires the fund to identify any benchmark used to measure performance. We find that out of 16,082 observations with performance-based compensation, 77.9% disclose the benchmark(s) used to evaluate performance. For example, a common benchmark for large-cap value equity funds is the Russell 1000 Value Index. For the remaining observations, we find no benchmark information or the information given is vague (e.g. "appropriate benchmark" or "applicable peer groups").

In Panel E, we conclude the description of managerial compensation data with the correlation matrix of compensation structures. Performance-based compensation is negatively correlated with compensation based on the advisor's profit but positively correlated with compensation based on the fund's AUM. The evaluation period tends to be shorter when the manager's compensation depends on the fund's AUM or the advisor's profit, in addition to the fund's performance. It is also shorter when at least part of the compensation is deferred.

We observe that portfolio manager compensation structures do not change much over time during our sample period (see Table IA.II of the Internet Appendix). Moreover, we find that cross-sectional variation in portfolio manager compensation structures arises mainly at the fund family or advisor level (a given family may have more than one advisor if one or more funds are outsourced to an unaffiliated subadvisor). In particular, we find that only 15% of family-year observations show some within-family variation in *Performance pay*, *Advisor-profit pay*, or *Deferred compensation,* with this percentage decreasing to 13% for *AUM pay*. We further find that 30% of family-year observations exhibit some within-family dispersion in *Evaluation period Mean*. 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-manager's compensation structure in our analysis. Given the nature of the variation in our data, we conduct our analysis at fund-year level and cluster standard errors at the family level in all of our regression specifications to account for the within-family residual cross-correlation (Petersen (2009)).

III. Determinants of Portfolio Manager Compensation Structures

A. Hypothesis Development

An extensive literature studies managerial compensation contracts. In the mutual fund industry, the portfolio manager compensation contract is the outcome of an unobserved negotiation between the individual manager and the investment advisor for the provision of asset management services to fund investors. Our unique data allow us to analyze for the first time the determinants of portfolio manager compensation structures using a set of advisor-, manager-, and fund-level variables proposed in the literature. Our empirical analyses test three broad hypotheses, which we discuss in detail below.

HYPOTHESIS 1: *Performance-based pay and deferred compensation are more prevalent when the intensity of agency conflicts is higher.*

Our first empirical hypothesis comes from theoretical predictions of optimal contracting theory. The relative performance bonus feature, in particular, is consistent with the informativeness principle of contract theory (Holmstrom (1979) and Grossman and Hart (1983)).[10] In the setting of portfolio management delegation, the manager chooses not only the portfolio's risk, but also the amount of effort to expend in managing the fund. A number of theoretical models predict that optimal contracts must include an asymmetric, performance-based component where performance is measured relative to an optimal benchmark (e.g., Starks (1987), Li and Tiwari (2009), and Cuoco and Kaniel (2011)). This begs the question of why we do not observe relative performance-based contracts among all portfolio managers. The reason is that these contracts are potentially costly for advisors and, ultimately, fund investors. First, these complex contracts entail direct information-processing and monitoring costs.[11] In addition, they are associated with a number of indirect costs.

[10] The informativeness principle of Holmstrom (1979) implies that any signal that, at the margin, is informative about an agent's effort should be included in the contract.

[11] For instance, the contract must specify the benchmark(s), the evaluation period, the sensitivity of bonus pay to relative performance, whether the bonus is based on before- or after-tax performance, etc.

For instance, to induce the required level of effort, risk-averse managers are exposed to more risk than they would like to take, which they must be compensated for. Furthermore, Grinblatt and Titman (1989) show that managers compensated with asymmetric performance contracts may have perverse incentives to "game" the contract and take excessive risk at the expense of fund investors. Finally, Garvey and Milbourn (2003) suggest that relative performance pay may induce unwanted managerial turnover if managers' outside opportunities fluctuate with the market. Essentially, the cost-benefit tradeoff predicts that performance-based contracts will emerge as optimal only if agency conflicts are severe enough.

We identify potential conflicts of interest at two layers: (i) between the investment advisor and fund investors and (ii) between the investment advisor and the portfolio manager. First, to capture conflicts between the advisor and the fund investors, we use two proxies: (i) the extent of heterogeneity in the advisor's clientele (*Client HHI*), which is defined in the Appendix, and (ii) the number of affiliations that the advisor has in the financial industry. A more heterogeneous clientele could exacerbate conflicts of interest between the advisor and mutual fund investors by increasing the likelihood of more managerial talent or effort being allocated to clients other than the mutual fund. Likewise, managers working for advisors with a more diverse clientele are more likely to engage in cross-client subsidization (e.g., Gaspar, Massa, and Matos (2006), and Chaudhuri, Ivković, and Trzcinka (2018)). Based on the predictions of optimal contracting theory, advisors with more dispersed investor clientele are more likely to use performance-based incentives (*Performance pay*), as such a scheme signals to fund investors that the portfolio manager's incentives are aligned with those of investors', that is, maximizing fund performance. At the same time, however, because the advisor will likely have more diverse investment strategies and hire managers with different skill sets when the advisor's clientele is more disperse, the advisor's profit becomes a less precise signal of a given individual manager's effort due to the variety of capital sources, strategies, and models behind the advisor's profit. Indeed, according to Holmstrom's (1979) informativeness principle, manager compensation should be less strongly associated with the advisor's profit when the advisor has a more disperse clientele.

Next, we investigate the affiliations of the investment advisor. Form ADV from the SEC states that such information "identifies areas in which conflicts of interest may occur." In particular, we study whether the advisor is affiliated with a broker (*Broker*), and hence likely to be more interested in increasing fund trading volume and turnover than performance. Another source of agency conflicts may come from affiliation with a bank (*Bank*). Bank-affiliated mutual funds may engage in activities to support the controlling banks at the expense of mutual fund investors (e.g.,

Golez and Marín (2015), Ferreira, Matos, and Pires (2018), and Gil-Bazo, Hoffman, and Mayordomo (2017)). Whether affiliated with a broker or a bank, we expect the likelihood of explicit performance-based compensation to be higher as it serves as a mechanism to curb these agency conflicts.

To capture conflicts between the advisor and the portfolio manager, we again use two variables: (i) a dummy variable that identifies whether the manager is a founder or a significant stakeholder of the advisor (*Owner*), and (ii) the manager's ownership in the advisor (*Adv. ownership*). Higher ownership aligns the objectives of the advisor and the manager (e.g., Jensen and Meckling (1976)) and reduces both information asymmetry and the intensity of moral hazard concerns. We therefore expect a lower prevalence of performance-based pay when managers have higher ownership in the advisor or when they are the founder or a significant stakeholder of the advisory firm. Additionally, we expect managers who are simultaneously a significant investor or a founder of the advisor to participate in the advisor's profit.

We also note that our data allow us to analyze deferred compensation of portfolio managers, which has not been studied.[12] Based on the description of managerial compensation from funds' SAI, we conjecture that deferred compensation is designed to alleviate myopic behavior of portfolio managers and better align their long-term objectives.[13] We thus expect that the need of deferred compensation increases when the intensity of agency conflicts is higher.

HYPOTHESIS 2: *Alternative mechanisms make explicit performance-based incentives redundant.*

The substitution of explicit contract incentives with alternative monitoring mechanisms has been formalized in the theoretical literature (e.g., Arnott and Stiglitz (1991) and Gibbons and Murphy (1992)). We consider several monitoring mechanisms related to (i) fund investors, (ii) portfolio managers, (iii) the mutual fund market, and (iv) advisory firms. In particular, at the investor level, we construct proxies for investor sophistication. At the manager level, we study the portfolio manager's investment in the fund ("skin in the game"). Turning to "market discipline," we study the fund's flow-performance sensitivity. Finally, we investigate the role of advisors' monitoring in the case of outsourced funds. We discuss each mechanism in detail below.

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[12] In a different setting from our analysis, Khorana, Tufano, and Wedge (2007) and Chen, Goldstein, and Jiang (2008) study the effect of deferred compensation plans in the compensation of fund board directors.

[13] The following example is from RREEF America L.L.C., a subsidiary of Deutsche Asset & Wealth Management: "There is a deferred component of the incentive compensation…that takes the form of Deutsche Bank AG corporate stock that vests over time, currently four years. Deutsche Bank stock broadly aligns the team with broader bank goals, and the deferral creates effective to discourage departures, especially to competitors."

First, more sophisticated investors could be associated with better monitoring skills (e.g., Evans and Fahlenbrach (2012)), which would lower the intensity of moral hazard and the need for explicit performance-related compensation schemes. Following Evans and Fahlenbrach (2012), we measure investor sophistication using a dummy variable for pure institutional mutual funds (*Institutional fund)* that takes a value of one if all share classes of the fund are the institutional share class. As a robustness test, we also use the fund's *Average account size* as a proxy for higher monitoring incentives (Massa and Patgiri (2009)). As expected, we find that institutional funds have a significantly larger average account size. This argument predicts that institutional funds or funds with higher average account size have less need for performance-based incentives. However, the opposite could be true if investors with higher sophistication are able to negotiate (or self-select into) performance-based contracts that are more in line with their interests. Whether our proxies are associated with a decrease or an increase in the likelihood of performance-based compensation is, therefore, an empirical question.

Second, portfolio managers may own shares of the mutual funds they manage. Such fund ownership by portfolio managers could also serve as an incentive alignment mechanism. Studies show that managerial fund ownership is associated with superior fund performance and less agency-induced risk-taking (e.g., Khorana, Servaes, and Wedge (2007), Ma and Tang (2018), Lee, Trzcinka, and Venkatesan (2018)). We therefore collect data on managerial fund ownership (*Fund ownership*) and test whether fund ownership works as a substitute for performance-based compensation.

Third, we consider the redemption mechanism in the mutual fund market as a monitoring device. Chen, Goldstein, and Jiang (2008) argue that when investment flows are more sensitive to performance, the market provides incentives for managers to work harder. Thus, we test whether market discipline via the flow mechanism (*Flow-perf. sensitivity*) and explicit performance-based compensation are substitutes.

Finally, we study the interaction between the threat of dismissal outside firm boundaries and compensation contract design. Chen et al. (2013) find that due to the difficulty of coordinating incentives outside firm boundaries, managers of outsourced funds are subject to higher threat of dismissal (i.e., terminating the subadvisory contract) for poor performance than in-house managed funds. We test whether the advisor's threat of dismissal is related to the subadvisor's design of portfolio manager compensation. If these mechanisms serve as substitutes for effort inducement, we should observe a lower incidence of performance-based pay among subadvised funds (*Subadvised*) compared to in-house funds, all else being equal.

HYPOTHESIS 3: *Compensation contract design is related to portfolio managers' characteristics.*

We investigate whether various characteristics of portfolio managers are related to the design of the compensation contract, including (i) managerial experience, (ii) the number of funds managed by the portfolio manager, (iii) solo versus team management, and (iv) the manager's outside labor opportunities.

First, the tournament model of Heinkel and Stoughton (1994) predicts that more experienced managers are more likely to receive performance-based incentives, as their negotiation power increases with experience. Moreover, career concerns are less powerful as a disciplining mechanism for more experienced managers as they are likely to be more entrenched (e.g., Gibbons and Murphy (1992) and Chevalier and Ellison (1999)). Thus, performance-based pay may work as an alternative mechanism to discipline more experienced managers. Both arguments predict a positive relation between the portfolio manager's experience (*Experience*) and performance-based compensation.

Second, as the number of funds managed by a portfolio manager increases, performance-based contracts could create agency conflicts between different funds (i.e., due to cross-fund subsidization), especially if only a subset of these funds employ them.[14] As it could be costly for the advisor to monitor these agency conflicts, we would expect to observe less performance-based pay as the number of funds managed by the manager (*#Funds managed*) increases. On the other hand, one could argue that "busier" portfolio managers (those with more accounts under management) need more explicit incentives for effort expenditure. If this effect dominates, we would expect a positive relation between *Performance pay* and the number of funds managed.

Third, free-rider problems may emerge among portfolio management teams, which would distort effort provision incentives. Holmstrom (1982) predicts that performance-based contracts can restore efficiency in managers' effort decisions in teams. However, ascribing performance to an individual manager's effort is more challenging in team-managed versus solo-managed funds, which would predict a lower incidence of performance-based pay in team-managed funds based on Holmstrom's (1979) informativeness principle. Ultimately, whether team management (*Team*) is associated with a higher or lower likelihood of performance-based pay is an empirical question.

[14] As an example, the following statement is included the SAI of the Small and Mid-value Calvert funds managed by Channing Capital Management, LLC: "Whenever a portfolio manager manages other accounts, including accounts that pay higher fees or accounts that pay performance-based fees, potential conflicts of interest exist, including potential conflicts between the investment strategy of the Fund and the investment strategy of the other accounts and potential conflicts in the allocation of investment opportunities between the Fund and such other accounts."

Finally, we explore how the manager's outside options affect contract design. Linking a manager's pay to the advisor's profit may work as a retention mechanism when expensive contract renegotiations are more likely. In particular, the model of Oyer (2004) assumes that renegotiating compensation is costly and shows that it may be optimal for the advisor to tie the manager's compensation to her outside opportunities, as proxied by the advisor's profit, even if this mechanism does not directly improve fund performance.[15] Accordingly, we conjecture that renegotiation is more likely and costly (due to competition for talent) when the advisor is located in cities with a higher density of advisors, as measured by the total AUM of other advisory firms in the same city (Ln(*City AUM*)). By the same argument, we expect this variable to be positively related to *Deferred compensation* if this structure is used as a retention mechanism.

B. Empirical Methodology

We employ the following logistic model to analyze the determinants of the compensation structures of portfolio managers:

$$y_{i,t}^{*j} = \alpha + \beta Determinants_{i,t-1} + \gamma Controls_{i,t-1} + \lambda y_{i,t}^{-j} + \delta_{org,t} + \tau_t + \varepsilon_{i,t},$$

$$y_{i,t}^{j} = 1\,[y_{i,t}^{*j} > 0], \tag{1}$$

where *i* indexes mutual funds and *j* indexes compensation structure, $y_{i,t}^{j}$ is a dummy variable equal to one if the compensation of portfolio managers that manage fund *i* includes the structure *j* = *{Performance Pay, Advisor-profit pay, AUM pay,* or *Deferred pay}* in year *t* and zero otherwise, $Determinants_{i,t-1}$ is a vector of lagged determinant variables as discussed in Section III.A, $Controls_{i,t-1}$ is a vector of lagged control variables at the family level (family size and asset growth) and the fund level (objective, size, age, and expense ratio), $\delta_{org,t}$ is a vector of dummy variables for the advisor's legal organization form (corporation, LLC, partnership, other) and τ_t denotes year dummies. Since compensation structures are not mutually exclusive, in each specification we control for the three alternative compensation structures ($y_{i,t}^{-j}$) to isolate the relation between the determinant variables and each pay structure. To alleviate reverse causality

[15] Oyer (2004) cites as an example a study by Drago and Heywood (1995) on Australian firms where "profit sharing is relatively common at firms whose workers are highly skilled and who have invested in firm-specific human capital," and "(managerial) turnover is negatively associated with profit sharing, which is consistent with profit sharing having a stabilizing effect."

concerns, we lag all determinant and control variables by one year. Since the compensation structures of funds from the same family can be correlated, we adjust standard errors for heteroskedasticity and cluster standard errors at the family level (Peterson (2009)).

As specified in equation (1), we control for various advisor, fund, and family characteristics that may affect compensation contract design. First, we control for the advisor's legal organization form. The separation between ownership and control is likely to be lower in sole proprietorships and partnerships than in corporations, which indicates lower intensity of agency conflicts. Thus, we expect a lower incidence of *Performance pay* and a higher incidence of *Advisor-profit pay* among the former type of advisors. Larger family size may also be an indicator of more complex structures with higher direct monitoring costs, increasing the need for performance-based pay. On the other hand, the larger the family size, the lower the marginal contribution of a particular portfolio manager to the advisor's profit, which suggests less *Advisor-profit pay* among larger families. Moreover, we include family asset growth as a control variable. As the fund family's AUM grow, both bonuses and the manager's base salary are likely to be positively affected. If the base salary increases enough, it may serve as a substitute for other explicit incentives in the contract. We next control for the fund's *Tracking error volatility*. Holmstrom's (1979) informativeness principle suggests that more volatile (relative) fund performance should be associated with lower prevalence of *Performance pay.* Finally, we control for the fund's investment objective, size, age, and expense ratio to account for the possibility that certain fund characteristics may be associated with a particular type of contract.[16]

Before we analyze the regression results, in Table II we present summary statistics for all of the advisor-, fund-, and portfolio manager-level variables that we use to explain the heterogeneity in compensation contracts. Detailed variable definitions and data sources are provided in the Appendix. For advisor characteristics, the mean value of advisor clientele dispersion (*Client HHI*), measured by the Herfindahl-Hirschman Index across 10 different client types disclosed in Form ADV, is 0.35. In 83% (65%) of the observations, the advisor is affiliated with a broker-dealer (bank). In 18% of observations, the portfolio manager is the founder, controlling owner, principal partner, or block holder of the advisor (*Owner*), portfolio managers own, on average, 8.0% of the shares of the advisory firm they work for (*Advisor ownership*), with a median ownership of zero. Similar to prior studies (e.g., Chen et al. (2013)), about 21% of our

[16] Including fund size and expense ratio could control for the fund manager's perceived skill, according to Berk and Green (2004).

sample funds are managed by an external subadvisor.[17] Finally, the mean value of the total AUM of other advisors headquartered in the city (*City AUM*) is $2,606 billion, with a median of $571.6 billion, as the distribution is right-skewed.[18]

[Insert Table II here]

Regarding fund and portfolio manager characteristics, we first observe that about 6% of the observations are classified as pure institutional funds. For an average fund, the average account size is close to $6,000 and the flow-performance sensitivity is 0.04. On average, a portfolio manager owns about $370,000 in her fund, has almost ten years of industry experience, and manages about six funds. We further find that 66% of the funds are managed by a team. Table IA.III in the Internet Appendix reports the correlation matrix for all determinant variables.

Finally, looking at the control variables, an average fund in our sample has about $1.5 billion in AUM, around a 15-year history, and an expense ratio of 1.17%. Such a fund is part of a family of funds with a total of $86.5 billion AUM, with asset growth of 13% a year (including both net flows and return on AUM). The average tracking error volatility is about 5% and the average portfolio turnover is 92%. Fewer than 5% of funds include a performance adjustment in the advisory fee contract. We also consider the advisor's organization form. The distribution across the five different forms for all fund-year observations is as follows: corporation (55.9%), limited liability company (LLC) (28.4%), partnership (4.1%), sole proprietorship (0.03%), and others (11.6%).

C. Empirical Results on the Determinants of Compensation Structures

In this section, we analyze results from logistic regressions on the determinants of compensation structures of portfolio managers in the U.S. mutual fund industry.[19] We present the results in Table III, where we group the key explanatory variables by hypothesis: first the proxies for the intensity of agency conflicts (Hypothesis 1), then the variables regarding alternative

[17] We follow Chen et al. (2013) and classify a fund as externally subadvised (outsourced) if the 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 first check the family name and the advisor name, both obtained from N-SAR filings. When the two names do not match, we use the information in the fund's SAI to check whether there exists any affiliation between the two.

[18] The advisors in our sample are headquartered in 282 different cities. However, more than 51% of all observations are concentrated in six cities: New York City, Boston, Chicago, Baltimore, San Francisco, and Minneapolis. In terms of total AUM, New York City is at the top of the list every year, with Boston being the second.

[19] Results using a probit model and a linear probability model are qualitatively similar. See Tables IA.IV and IA.V of the Internet Appendix, respectively.

monitoring mechanisms (Hypothesis 2), and managerial characteristics (Hypothesis 3). We discuss the results for each hypothesis in detail below.

[Insert Table III here]

C.1. Hypothesis 1: Intensity of Agency Conflicts

In this section, we analyze results from tests of our first hypothesis on the relation between compensation structures and the intensity of agency conflicts. We start in column (1) of Table III with the determinants of performance-based pay. First, we find that performance-based pay is significantly more prevalent when the advisor's clientele is more disperse. In terms of economic significance, a one-standard-deviation decrease in *Client HHI* is associated with a 3.4% (=12.46%*0.27) increase in the probability of performance-based incentives. Second, performance-based pay is 6.1% more likely to be present if the advisor is affiliated with a broker-dealer and 10.0% more likely if the advisor is affiliated with a bank.[20] Third, performance-based pay is used significantly less frequently when the portfolio manager is a founder/owner/principal partner of the advisor. In such a case, the portfolio manager is presumably receiving compensation that depends in part on the advisor's profits. For instance, based on the results in column (1), the probability of performance-based pay decreases by 12.1% if the portfolio manager is a founder/owner/principal partner of the advisor based on information disclosed in the fund's SAI. We also find that a one-standard-deviation increase in the portfolio manager's *Adv. ownership* is associated with a 2.3% decrease in the likelihood of receiving *Performance pay*. All of the variables pertaining to Hypothesis 1 are statistically significant at the 5% level or better, except the *Broker* affiliation, which is significant at the 10% level. Taken together, these results suggest that, as predicted by contracting theory, *Performance pay* is more likely when the agency conflicts between investors and the advisor or between the advisor and portfolio managers are more severe.

In columns (2) and (3) of Table III, we analyze the relations between the variables from Hypothesis 1 and both *Advisor-profit pay* and *AUM pay.* First, as predicted, *Advisor-profit pay* is more likely to be present when the advisor's clientele is more concentrated. For instance, the coefficient on *Client HHI* is positive and significant at the 5% confidence level in column (2). Economically, a one-standard-deviation increase in *Client HHI* is associated with a 7.3% increase in the probability of *Advisor-profit pay*. In other words, contrary to *Performance pay*, more

[20] If we include in the regressions a variable that counts the total number of affiliations, this variable also predicts higher likelihood of performance-based incentives. However, it becomes insignificant after including broker and bank affiliation dummies.

dispersed clientele makes *Advisor-profit pay* less likely since the advisor's profit is a less precise predictor of the portfolio manager's individual effort. Second, as expected, *Advisor-profit pay* is strongly and positively associated with *Owner*. Portfolio managers who are a founder/owner/principal partner of the investment advisory firm show a clear preference for this type of compensation: they are 55.4% more likely to receive *Advisor-profit pay*. In our analysis of the determinants of *AUM pay*, reported in column (3), we find that the explanatory power of the proxies for the intensity of agency conflicts is very limited: none of the coefficients turns out to be statistically significant.

Finally, in column (4) we analyze the results for deferred compensation. We find that deferred compensation is significantly more likely to be present when the advisor is associated with a *Broker*: the probability of deferred compensation increases by 26.1% when the advisor is affiliated with a broker-dealer. In addition, deferred compensation is 29.0% less likely when the manager is identified as the *Owner* of the advisor based on information disclosed in funds' SAI. Moreover, a one-standard-deviation increase in the portfolio manager's *Adv. ownership* is associated with a 7.4% decrease in the likelihood of receiving deferred compensation. Taken together, this evidence is consistent with the role of pay deferral as a mechanism to align the incentives of advisors and portfolio managers when the costs of potential agency conflicts are expected to be large.

Overall, the results above provide strong and robust evidence in support of our first hypothesis. More specifically, consistent with optimal contracting theory, performance-based incentives and deferred compensation are more prevalent when the intensity of potential agency conflicts is higher.

C.2. Hypothesis 2: Alternative Monitoring Mechanisms

Our second hypothesis is that alternative monitoring mechanisms reduce the need for explicit performance-based incentives. We first analyze results from our proxy for investor sophistication: the dummy variable *Institutional fund*. We find that the probability of receiving performance-based pay is 8.2% lower for institutional funds (significant at the 10% level), as shown in column (1) of Table III. This evidence suggests that funds owned by institutional investors benefit from better monitoring and are less likely to use performance-based compensation. Results are qualitatively similar when we replace the *Institutional fund* dummy with an alternative proxy based average investor account size (*Average account size*), see Table IA.VI of the Internet Appendix.

Second, we do not find robust evidence that the likelihood of performance-based pay is affected by portfolio managers' ownership in the fund. In addition, we do not find that *Deferred compensation* is significantly related to *Fund ownership*. Overall, we do not find much support for substitution between performance-based pay and managerial fund ownership.

Regarding the fund flow discipline mechanism, we find that *Flow-performance sensitivity* is negatively related to performance-based pay, with the coefficient significant at the 10% level. *Flow-performance sensitivity* is unrelated to advisor-profit-based pay and deferred compensation. As well documented in prior literature (e.g., Chevalier and Ellison (1997) and Sirri and Tufano (1998)), fund flows exhibit a convex relation with respect to fund performance. The substitution hypothesis predicts that explicit performance-based incentives could be replaced by implicit incentives due to fund flow-performance sensitivity. We find some evidence in favor of the substitution hypothesis.

Finally, we find that being outsourced to an unaffiliated subadvisor has a significant effect on portfolio manager compensation design. When the fund is subadvised, the likelihood of *Performance pay* decreases by 8.5% (significant at the 5% level), while the likelihood of *Advisor-profit pay* increases by 13.9% (significant at the 10% level). Portfolio managers of outsourced funds are subject to a higher threat of dismissal for poor performance compared to in-house managed funds (Chen et al. (2013) and Kostovetsky and Warner (2015)). Our evidence suggests that when the contract is signed beyond the boundaries of the fund family, other disciplining mechanisms (e.g. threat of termination of the subadvisory contract) make *Performance pay* redundant.

Overall, we find mixed evidence regarding our Hypothesis 2 on alternative monitoring mechanisms. On the one hand, we find that threat of dismissal for subadvisors, monitoring of institutional investors, and market discipline via the flow-performance relation serve as substitutes for performance-based contracts. One the other hand, we do not find robust evidence on the substitution effect for managerial fund ownership.

C.3. Hypothesis 3: Portfolio Manager Characteristics

In this section we test our Hypothesis 3 on whether the compensation structures are affected by portfolio manager characteristics, including (i) industry experience, (ii) number of funds managed, and (iii) part of a team or solo-manager, as well as by (iv) managers' outside labor options in the same city.

First, as shown in column (1) of Table III we do not find evidence of a positive relation between performance-based incentives and portfolio managers' industry experience. Industry experience is not significantly related to any of the four compensation structures we analyze. Hence, we do not find support for the theoretical prediction of Heinkel and Stoughton (1994) or for substitution between performance-based pay and career concerns (e.g., Gibbons and Murphy (1992)).

Second, we find that *# Funds managed* is significantly negatively related to *Advisor-profit pay*. Based on the results in column (2), a one-standard-deviation increase in *# Funds managed* is associated with a 5.2% decrease in the likelihood of *Advisor-profit pay*. Therefore, "busier" portfolio managers receive significantly less compensation based on the advisor's profit. The evidence in favor of muting *Performance pay* for managers with more funds is not statistically significant.

Third, in column (4) we find that team-managed funds are more likely to use deferred compensation than solo-managed funds. The difference in the likelihood is 9.0% (significant at the 10% level). No other contract feature is significantly affected by the variable of team management. This is not entirely surprising since there are contradicting predictions about the direction of the effect of team management, particularly with regard to the relation with *Performance pay*.

Finally, *City AUM* is significantly and positively related to *Advisor-profit pay*. Based on results in column (2), a one-standard-deviation increase in Ln(*City AUM*) is associated with a 9.2% increase in the likelihood of *Advisor-profit pay*. We interpret this result as evidence in favor of *Advisor-profit pay* as a retention mechanism in environments where competition for managerial talent is fiercer (i.e., cities with larger total AUM) and contract renegotiation is more costly for the advisor. However, we find no significant relation between Ln(*City AUM*) and *Deferred compensation*.

Overall, we find limited support for Hypothesis 3 regarding portfolio manager characteristics.[21] On the one hand, we do not find evidence of managerial experience or team management significantly affecting contract designs. On the other hand, we find that "busier" portfolio managers receive significantly less advisor-profit-based incentives. Also, advisors in cities with higher total AUM tend to use advisor-profit-based incentives more often.

[21] A word of caution on the interpretation of results on our third hypothesis is in order since the observed contract is the equilibrium output of negotiation between the advisory firm and the portfolio manager. It is therefore challenging to identify whether the ultimate driver of the contract features are advisors' or portfolio managers' characteristics, even after including various control variables. Our analysis in Section III.D.2 based on advisory firm changes could help alleviate these concerns.

C.4. Additional Discussion

We next discuss results pertaining to the control variables. We find that *Family size* is significantly and positively associated with *Performance pay* in column (1) of Table III. This result is consistent with more complex hierarchies in larger families and the need for performance-based pay to align incentives. In contrast, the coefficient on family size in column (2) is negative and significant for *Advisor-profit pay*. This result is consistent with the informativeness principle since, for larger families, the advisor's profit becomes a nosier signal of the portfolio manager's effort. In addition, we find that the coefficient on *Family growth* is insignificant in all four specifications. That is, we do not find support for the conjecture that faster growing families use different compensation structures. In the case of *AUM pay*, it is interesting to note that it is not fund size but rather family size that affects the likelihood of AUM-based pay. The coefficient on *Family size* is negative and significant at the 1% level in column (3), while the coefficients on *Fund size* and *Age* are both insignificant. We find that funds with a higher expense ratio (*Expense*) are significantly more likely to receive AUM-based pay. The use of *Performance pay* is not significantly related to the fund's *Tracking error volatility.*

We next analyze the results on advisors' legal organization form. The default legal form is *Corporation*. We remove *Sole proprietorship* since only six observations with this legal form use *Advisor-profit pay* exclusively. We find that *Performance pay* is 17.3% less likely to be used by a *Partnership* compared to a *Corporation*. Symmetrically, *Limited Liability Company* advisors are 17.2% more likely to use *Advisor-profit pay* compared to *Corporation* advisors. We do not find any evidence suggesting that partnerships are different from corporations in their use of *Advisor-profit pay*. Overall, these results suggest that different legal forms tend to be associated with different compensation structures. The lower prevalence of performance-based pay among partnerships is consistent with our first hypothesis, as there is a lower degree of separation between ownership and control (with the corresponding attenuation of agency conflicts). There is no specific compensation pattern across the fund objectives after including all of the other determinants in the regression, except that "other funds" are less likely to use performance-based incentives.

Regarding the interactions among the different compensation structures, we observe a complementarity between *Performance pay* and *AUM pay*. For instance, based on the results in column (1), contracts with *AUM pay* are 19.9% more likely to include *Performance pay*, after controlling for the rest of the determinants in the regression. Likewise, the results in column (3)

reveal that contracts with *Performance pay* are 28.1% more likely to include *AUM pay* when all other determinants are included in the regression. Both results are statistically significant at the 1% level.

D. Robustness Tests

In this section, we perform two sets of robustness tests to assess the sensitivity of our baseline findings in Table III.

D.1. Simulation of Randomly Assigned Contracts

The evidence in Section III.C suggests that compensation contracts of portfolio managers are designed to mitigate agency conflicts in the absence of alternative monitoring mechanisms. To address the concern that our data measure portfolio manager compensation only coarsely, in this section we use simulations to show that our results are not spurious. In the simulations, we regress randomly assigned compensation structures on the determinant variables of our sample funds used in Table III. If all of the significant relations between the determinant variables and actual compensation structures in Table III turn insignificant when we use randomly assigned compensation structures, this would suggest that our data capture meaningful information about portfolio manager compensation. In contrast, if the significant coefficients in Table III remain significant with randomly assigned compensation structures, this would suggest that our results are spurious.

For each year in our sample, we randomly reshuffle the compensation structures of our sample funds while keeping the values for all other variables the same. To do so, we randomize all four compensation structures (i.e., *Performance pay*, *Advisor-profit pay*, *AUM pay*, and *Deferred compensation*) simultaneously. This ensures that the distribution of compensation structures of the simulated fund sample matches exactly the distribution of the actual fund sample as shown in Panels A and C of Table I. We simulate the entire actual fund universe 1,000 times. After each simulation, we repeat the logistic regressions in Table III by relating randomly assigned compensation structures to the same set of determinants and control variables.

Table IV reports summary statistics on the distribution of the *t*-statistic for each determinant variable across the 1,000 bootstrapped simulations. These statistics can be compared to the corresponding *t*-statistics from the analysis of the actual funds in Table III. The results in Table IV show evidence of a relation between performance-based pay and any of the determinant variables in the simulated fund samples in fewer than 10% of the simulations, consistent with what one would expect by chance. For instance, the mean and median *t*-statistics for each of the 13

determinant variables are close to zero, in sharp contrast to the evidence in Table III. We find similar evidence for the other three structures, that is, *Advisor-profit pay*, *AUM pay*, and *Deferred compensation*. The simulation analysis therefore confirms that our previous findings on the determinants of compensation structure are unlikely to be spurious.

[Insert Table IV here]

D.2. Change of Advisory Firm

In a second robustness test, we focus on changes in the advisory firm (either the advisor or the subadvisor) to analyze whether the determinant variables can predict changes in the portfolio manager compensation structures in the directions suggested by our hypotheses. There are, in total, 423 changes in advisory firm in our sample. We identify 79 fund-year observations in which advisors merged or split and 344 fund-year observations in which the subadvisor was replaced. Table IA.VII in the Internet Appendix lists all the funds, the former advisor, and the new advisor after the change, together with the year of the change. Although we cannot claim that these changes are exogenous to the contract design, and thus we cannot make any inference on causality, this analysis presents further evidence on our hypotheses when the contract determinants change due to a change in advisory firm.

We separately test what drives the decision to adopt a given structure as well as the decision to drop it. Thus, for every compensation structure, we create two indicator variables: (i) *Adopt* equals one if that structure changes from nonpresent to present, and zero otherwise; (ii) *Drop* equals one if that structure changes from present to nonpresent, and zero otherwise. The change in a determinant is estimated as the difference between the current value of the variable and the value of the same variable the year before the change. None of the funds without *Performance pay* was a pure institutional fund (neither before nor after the change in advisor). Hence, we replace the *Institutional fund* dummy with the variable *Average account size* as a proxy for investor sophistication. We then analyze whether contract changes are related to changes in the determinants using pooled OLS. We use OLS regressions rather than logistic regressions since the latter cannot be estimated in samples with a very small number of observations.

We present the regression results in Table V. In line with Hypothesis 1, we find that advisors tend to adopt or keep *Performance pay* and/or *Deferred compensation* in their contracts when the severity of agency conflicts increases. For instance, when clientele heterogeneity increases (lower *Client HHI*), the probability of adopting both *Performance pay* and *Deferred compensation* increase significantly. *Bank* affiliation is also associated with a 10.4% lower probability of

switching off *Performance pay*, although the effect is significant only at the 10% level. The probability of dropping (adopting) *Deferred compensation* is 55.1% (18.7%) lower (higher) when the new advisor is affiliated with a *Broker (Bank)*. Finally, when the manager is the *Owner* of the new advisory firm, the probability of adopting *Deferred compensation* decreases by 17.8%, the probability of switching on *Advisor-profit pay* increases by 40.5%, and the probability of switching off *AUM pay* increases by 50.4%. Overall, these results lend further support to Hypothesis 1.

[Insert Table V here]

In line with Hypothesis 2, there is strong evidence that *Performance pay* is more likely to be adopted when the *Average account size* or the portfolio manager's *Fund ownership* decrease. If the fund's management is outsourced to an external advisory firm, the new contract is 21.2% more likely to drop *Performance pay*. Finally, consistent with the evidence in Table III, the support for Hypothesis 3 in Table V is much weaker. In particular, none of the variables analyzed has predictive power for the adoption or removal of *Performance pay* after a change in advisor. *Deferred compensation* is more likely to be adopted for portfolio managers with more *Experience* and, contrary to our prediction, less likely to be adopted by new advisory firms that locate in cities where other advisors have higher AUM. As the number of funds managed by the same manager increases, the new contract is more (less) likely to include (drop) *AUM pay*.

IV. Determinants of Performance Evaluation Period

In this section, we analyze the determinants of the length of the evaluation period for contracts with performance-based pay. Prior research on the evaluation period in the portfolio delegation literature is rather limited. We therefore develop our hypotheses from the literature on corporate executive compensation.

First, Gopalan et al. (2014) show that firms with longer-duration projects prefer longer-duration executive compensation. We therefore test whether funds with more short-term-oriented investors evaluate portfolio managers' performance over shorter evaluation periods. Following Jin (2005), we use the fund's lagged 12-month performance-flow sensitivity (*Flow-performance sensitivity*) as a proxy for investors' horizon, with higher short-term sensitivity implying a shorter investment horizon. As an alternative proxy for long-term investment horizon, we use the fund turnover ratio (*Turnover*). Arguably, if a fund's strategy relies on identifying mispricing that takes more time to correct (i.e., lower turnover), managers should be evaluated over a longer horizon.

Second, evaluating performance over a longer duration is likely to impose greater risk on portfolio managers as it is harder to deliver consistently above-benchmark performance over a

long horizon. According to Holmstrom's (1979) informativeness principle, investment strategies that entail higher benchmark-adjusted volatility should be associated with less (relative) performance-sensitive contracts. Based on this rationale, we expect funds with higher (lagged) *Tracking error volatility* to have shorter evaluation periods.[22] By the same logic, if fund performance is a noisier signal of managerial effort for team-managed relative to solo-managed funds, we should observe shorter evaluation periods for *Team* compared to solo-managed funds.

Finally, there are two opposing arguments regarding the relation between managerial *Experience* and the length of the evaluation period. On the one hand, if career concerns are less powerful a disciplining mechanism for more experienced managers (e.g., Chevalier and Ellison (1999)), advisors should choose longer performance evaluation periods for more experienced managers. On the other hand, based on the rent-extraction contracting framework of Bebchuk and Fried (2003), one could argue that managers with more experience are more likely to be entrenched and thus more inclined to award themselves short-term incentives to avoid the higher risk of long-term performance evaluation.

We test the above predictions using OLS regressions with the same set of control variables as in Table III. We also include fund investment objective and compensation structure dummies (except *Performance pay*) as additional controls. Regarding the control variables, we rely on the same arguments used to predict *Performance pay*. Larger families are more complex and their managers more difficult to monitor than those of smaller families. Thus, they may benefit more from the disciplining effect of long-term incentives. Families growing more aggressively will arguably find it optimal to use longer-term incentives. Further, if deferred compensation is used to mitigate managerial myopia and better align manager's long-term interests, we might expect it to serve as a substitute for longer evaluation periods.

We report the regression results in Table VI. First, we find support for the alignment of investors' investment horizon and portfolio managers' performance evaluation period. In particular, higher short-term sensitivity on the side of the investor is associated with shorter evaluation periods for portfolio managers. The coefficient on *Flow-performance sensitivity* is negative and significant at the 5% level in column (6). The economic magnitude is, however, relatively small. Based on the results in column (6), a one-standard-deviation increase in *Flow-performance sensitivity* is associated with a decrease of 0.03 a year in average evaluation period. In addition, funds managed by a *Team* are associated with significantly shorter evaluation periods compared

[22] Results are the same if we replace *Tracking error volatility* with Cremers and Petajisto's (2009) active share measure.

to solo-managed funds, with the difference equal to 0.38 a year based on the results in column (6). Finally, we find that the coefficients on *Turnover*, *Tracking error volatility,* and *Experience* are insignificant.

[Insert Table VI here]

As for the control variables, there is strong and robust evidence that larger families and families with higher asset growth are associated with longer evaluation periods. In terms of economic significance, based on the results in column (6), one-standard-deviation increases in *Ln(Family size)* and *Family growth* are associated with an increase in average evaluation period of 0.54 and 1.38 years, respectively. This evidence suggests that the evaluation period is determined at the family or advisor level rather than at the fund or manager level, similar to the evidence on compensation structures in Table III. We find no significant relation between evaluation period and *Deferred compensation*. In contrast, we find strong and robust evidence that *Advisor-profit pay* serves as a substitute for longer evaluation periods, conditional on contracts having *Performance pay* incentives. This evidence suggests that the performance evaluation period is a strategic choice within the global design of a compensation contract. The advisor's legal form is unrelated to the evaluation period. Finally, *Bond* and (especially) *Allocation* funds use shorter evaluation periods than *Domestic equity* funds.

V. Fund Performance, Fees, and Portfolio Manager Compensation

In this section, we study whether the compensation contracts of portfolio managers are related to future fund performance or mutual fund fees. In Section V.A, we analyze the relation between compensation structures and future fund performance (gross and net of fees). In Section V.B, we study the relation between compensation structures and mutual fund fees.

A. Fund Performance and Portfolio Manager Compensation

The evidence in Sections III and IV suggests that, by and large, portfolio manager compensation contracts are, optimally designed to mitigate potential agency conflicts in the absence of alternative monitoring mechanisms. In such an optimal contracting equilibrium, we would expect no performance difference (gross or net of fees) associated with any particular compensation arrangement (including performance-based pay), after carefully controlling for a comprehensive list of determinants related to the advisor, the fund, and portfolio managers. Alternatively, one could argue that some performance predictability could remain if there is a

residual component in compensation structures for reasons unrelated to ex ante incentive-alignment needs.

For diversified domestic equity funds, we estimate alpha using monthly fund returns and the Carhart (1997) four-factor model, which adjusts for market, size, book-to-market, and momentum factors. For bond funds, we estimate alpha using a bond four-factor model based on Elton, Gruber, and Blake (1995) and Cici and Gibson (2012).[23] For the remaining funds, we estimate alpha using a one-factor model, with the average return of peer funds in the same Morningstar category as the factor. For each of the alpha measures, we first estimate the factor loadings using the preceding 24 monthly fund returns (gross or net) and then calculate monthly alpha as the difference between a fund's return (gross or net) in a given month and the sum of the product of the estimated factor loadings and the factor returns during that month. We average the monthly alphas within a year and multiply it by 12 to obtain an annualized alpha measure. Gross alphas are computed using fund monthly gross returns calculated by adding back 1/12th of the annual expense ratio to monthly net returns. Table IA.VIII in the Internet Appendix reports summary statistics for these performance measures.[24]

We employ the following OLS specification to analyze the relation between compensation structures and future fund performance:

$$Y_{i,t} = \alpha + \beta * Comp.\ structure_{i,t-1} + \gamma * Controls_{i,t-1} + \lambda_{style} + \lambda_k + \mu_{i,t}, \qquad (2)$$

where the dependent variable $Y_{i,t}$ is the gross or net-of-fees alpha of fund *i* in year *t*. We use fund gross and net-of-fee alpha to estimate, respectively, the gross and net performance of portfolio managers. *Compensation structure* is the set of compensation structure variables (i.e., *Performance pay*, *Advisor-profit pay*, *AUM pay*, and *Deferred compensation*) as of year *t*-1. We use a comprehensive set of control variables in the regressions, including all of the determinant and control variables employed in Table III. We also include other variables typically associated with fund performance, including the fund's *Turnover* ratio and a *Performance advisory-fee* dummy that takes the value of one if the advisory fee is linked to fund performance, and zero otherwise. We measure all of the independent variables as of the previous year-end to address

[23] The bond four-factor model includes the CRSP value-weighted stock index, the U.S. aggregate bond index, the return spread between the high-yield bond index and the intermediate government bond index, and the return spread between the GNMA mortgage-backed security index and the intermediate government bond index.

[24] Consistent with prior literature (e.g., Jensen (1968), Elton, Gruber, and Blake (1996), Carhart (1997), Wermers (2000), and Fama and French (2010)), funds in our sample on average have negative factor model alphas on a net-of-fee basis.

potential reverse causality concerns. To alleviate the concern that some fund families use certain types of contracts (for example, *Performance pay*) and at the same time exert a positive effect on fund performance, we include high-dimensional *Fund family* × *Year* fixed effects (λ_k). We also control for Morningstar category fixed effects (λ_{style}) in the regression. Standard errors are clustered at the family level.[25]

We present the estimation results in Panel A of Table VII. After controlling for all of the variables specified above, we fail to find evidence of a relation between portfolio manager compensation and subsequent fund performance, either gross or net of fees.[26] This is consistent with our findings in Section III on the determinants of managerial compensation in the context of optimal contracting and agency costs. Consistent with the literature, fund size and turnover ratio are negatively related to fund performance in most specifications.

We also run the OLS regression (2) replacing $Y_{i,t}$ with the mean evaluation period for funds that use *Performance pay* to compensate their portfolio managers. The results are reported in Panel B of Table VII. Similar to Panel A, we find no relation between the average length of evaluation period and subsequent fund performance.[27]

[Insert Table VII here]

Taken together, our results suggest that contractual arrangements do not predict future fund performance, consistent with an optimal contracting equilibrium. That is, since advisors optimally choose the contract features that best resolve the underlying agency conflicts between portfolio managers and fund investors, in equilibrium we observe no difference in performance across compensation structures.

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[25] The sample used in the performance analysis is slightly smaller than the one used in Table III due to the additional filters we impose. First, to ensure data accuracy, we only retain in the sample those funds in the Morningstar and CRSP merged database of Pastor, Stambaugh, and Taylor (2015), as their study shows that there are certain discrepancies in mutual fund data between the Morningstar and CRSP mutual fund databases. Second, we follow Evans (2010) and use the fund ticker creation date to identify and exclude fund return data that are subject to incubation bias. Third, we require that a fund have a minimum of 12 monthly return observations in the estimation of the alpha measures.

[26] In Table IA.IX of the Internet Appendix, we repeat the analysis using a one-factor model for all funds, with peer fund performance as the factor. The results are qualitatively similar to those reported in Table VII. We also divide the diversified domestic equity funds into subsamples of growth, blend, and value funds in Table IA.X. We do not find a significant relation between any compensation structure and fund performance among value funds and blend funds, while we find evidence of outperformance associated with performance-based incentives among growth funds. Finally, as a robustness test, in Table IA.XI we remove the *Fund family* × *Year* fixed effects and include only year fixed effects. The relation between *Performance pay* and fund performance becomes slightly stronger compared to the results in Table VII. The difference is likely due to the fact that the tests in Table VII explore only within-family variation in compensation.

[27] We also examine whether the evaluation period is related to fund performance in the subsequent two- or three-year period in Table IA.XII. The results are qualitatively similar.

We note that the lack of performance predictability could also be consistent with other theories such as Berk and Green (2004). Under the assumption of a perfectly competitive mutual fund market and no asymmetric information, Berk and Green (2004) show that no observable variable (including portfolio manager compensation structure) should predict future net-of-fee returns as fund flows or fees would adjust until net alphas become zero. Based on their prediction, we would expect no difference in net performance across the observable compensation structures. However, the model of Berk and Green (2004) makes no prediction on the optimal contract design of managers' compensation. Hence, while our evidence on net fund performance by itself is consistent with Berk and Green (2004), one needs contract theory to explain both our evidence on the determinants of portfolio manager compensation and our evidence on mutual fund performance.

B. Fund Fee Structure and Portfolio Manager Compensation

In this section, we investigate whether the compensation structures of portfolio managers are related to mutual fund fees. Analyzing the relation with fund fees could shed more light on how portfolio manager compensation contract design relates to the fee contracts between the fund and investors. In particular, we first analyze the relation between compensation structures and total fund fees. To gain further insight, we separate total fund fees into two components: (i) advisory fees (i.e., the fee paid to the advisor for asset management service) and (ii) other fees (i.e., fees related to marketing, distribution, 12b-1, and bookkeeping). We measure fund fees and expenses as a percentage of fund AUM and as corresponding dollar value (=AUM × percentage fee). We estimate the relation between compensation structures and subsequent fund fees using equation (2) except that we use the fee variables as the dependent variable.[28]

We report the estimation results in Table VIII. First, we do not find any relation between fund total fees (either percentage or dollar value) and *Performance pay*. Interestingly, we find a positive and significant relation between fund advisory fees (both in percentage and dollar value terms) and performance-based incentives. In terms of economic significance, based on the results in columns (2) and (5), a change from zero to one for *Performance pay* is associated with a 4.6 basis point increase in the advisory fee rate or a 0.16 standard deviation increase in the logarithm of dollar advisory fees. This evidence is consistent with the idea that performance-based contracts are more costly to the advisor, and hence require higher advisory fees. In contrast, we find a

[28] To control for the well-known impact of fund size on fund fees, we control for the logarithm of previous year-end fund size in our regressions. In addition, as a robustness test in Table IA.XIII, we remove the *Fund family* × *Year* fixed effects. Results are qualitatively similar.

negative and significant relation between performance-based pay and fees related to marketing and distribution (both in percentage and dollar value terms). In terms of economic significance, a change from zero to one for performance-based pay is associated with a 6.4 basis point decrease in other fee ratio or a 0.22 standard deviation decrease in the logarithm of other fees in dollar value terms. We also find that *Advisor-profit pay* is associated with lower fund advisory fees, both in percentage and dollars. Finally, we find evidence that *AUM pay* is associated with higher total fees by charging higher advisory fees.

[Insert Table VIII here]

Overall, our evidence provides insights into an intriguing equilibrium in the mutual fund industry. For funds that operate in an environment with high potential for agency conflicts, advisors optimally choose to compensate portfolio managers with performance-based contacts, which are costly and require charging higher advisory fees. These funds make up for the advisory fee disadvantage by charging lower marketing and distribution fees. The two effects offset each other, resulting in no difference in total fund fees for investors across compensation contracts with and without performance-based pay.

VI. Concluding Remarks

In this paper, we use a hand-collected data set of over 4,500 funds to study the compensation structures of individual portfolio managers in the U.S. mutual fund industry. Given that the decisions of individual portfolio managers affect the performance of trillions of dollars of assets invested in the mutual fund industry, it is of first order importance to understand portfolio manager compensation and what drives the variation in compensation contracts.

Unlike the advisory contract, which is based mostly on the fund's AUM, the majority of compensation contracts for individual portfolio managers include a bonus that is explicitly 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 the tight regulation of advisory contracts, the SEC places no specific restriction on the compensation contracts of individual portfolio managers. Our evidence suggests that, in a less regulated setting, asymmetric, option-like performance-based incentives exist and indeed constitute the dominant form of compensation for individual portfolio managers.

We study the economic determinants of different contract features in portfolio manager compensation. Our results suggest that compensation contracts of portfolio managers are designed to mitigate agency conflicts in the absence of alternative monitoring mechanisms, which is

consistent with an optimal contracting equilibrium. Explicit performance-based incentives and deferred compensation are more prevalent when the intensity of potential agency conflicts is higher, for instance, when the advisor has more disperse clientele, when the advisor is affiliated with a broker-dealer or a bank, or when the portfolio manager is not the founder or a significant stakeholder of the advisor. We also find that investor sophistication and the threat of dismissal in outsourced funds work as substitutes for explicit performance-based incentives. We note that there is limited evidence that fund families use different portfolio manager compensation structures across funds within a family (with the exception of outsourced funds). We speculate that the reason for this pattern is that either tailoring contract to specific funds is too costly or the potential benefits are too small.

We complete the study by analyzing whether different compensation structures are related to fund performance and mutual fund fees. We find little evidence of differences in future fund performance associated with any particular compensation arrangement, which is also consistent with an optimal contracting equilibrium. In addition, we find that funds with performance-based contracts are associated with higher fund advisory fees and lower marketing and distribution fees. The two effects offset each other, resulting in no difference in total fees across funds with and without performance-based incentives.

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Appendix
Variable Definitions

Variable name	Data source	Units	Definition
		Advisor variables	
Client HHI	Form ADV-Schedule A, item 5D	#	In Form ADV, investment advisors need to specify their proportional clientele distribution among the following 10 categories: (i) individuals, (ii) high net worth individuals, (iii) banks, (iv) investment companies (including mutual funds), (v) pension plans, (vi) other pooled investment vehicles (e.g., hedge funds), (vii) charitable organizations, (viii) corporations, (ix) government entities, and (x) others. To capture the heterogeneity in the advisor's clientele composition, we construct a Herfindahl–Hirschman index measure as the sum of squares of the percentage of clients in each particular clientele type.
Broker	Form ADV-Schedule A, item 7A	Dummy variable	=1 if the advisor is affiliated with a broker or dealer, 0 otherwise.
Bank	Form ADV-Schedule A, item 7A	Dummy variable	=1 if the advisor is affiliated with a bank or thrift institution, 0 otherwise.
Owner	Fund's Statement of Additional Information (SAI)	Dummy variable	=1 if the portfolio manager is the founder, controlling owner, partner, or blockholder of the advisor, 0 otherwise.
Advisor ownership	Form ADV-Schedules B and C	%	Portfolio manager's ownership in the investment advisor.
Subadvised	Morningstar Direct and fund's SAI (prospectus)	Dummy variable	=1 if the advisor is not affiliated with the mutual fund family, 0 otherwise.
City AUM	Form ADV-Schedule A, item 5F	$Billion	Total assets under management by financial advisors in the same city, excluding the AUM of the advisor itself.
		Fund and portfolio manager variables	
Intuitional fund	Morningstar Direct	Dummy variable	=1 if all of the fund's share classes are the institutional share class, 0 if a fund has other share classes (e.g., retail share class). We construct this variable following Evans and Fahlenbrach (2012), and the share class is designated by Morningstar.

Avg. account size	Form NSAR	$ Thousand	Fund's average account size, which equals fund total net assets over number of shareholder accounts.
Flow-perf. sensitivity	Morningstar Direct		We regress fund net flows over the past 12 months on fund market-adjusted alpha (CAPM), and take the loadings on the market-adjusted alpha as the flow-performance sensitivity.
Fund ownership	Fund's SAI	$	Dollar amount of portfolio manager ownership in the fund, constructed following Khorana, Servaes, and Wedge (2007).
Experience	Morningstar Direct	Months	Difference between the sample year and the year when a manager first appears in the Morningstar database.
#Funds managed	Morningstar Direct	#	Number of funds managed by the portfolio manager(s) of the fund.
Team	Morningstar Direct	Dummy variable	=1 if a fund is managed by multiple managers, 0 otherwise.
		Control variables	
Family size	Morningstar Direct	$ Million	Sum of assets under management across all funds in the family, excluding the fund itself.
Family growth	Morningstar Direct	%	Annual gross growth of family assets (before netting out fund return).
Fund age	Morningstar Direct	Months	Age of the oldest share class in the fund.
Expense	Morningstar Direct	%	Ratio of the fund's annual operating expenses to the average dollar value of its assets under management.
Fund size	Morningstar Direct	$ Million	Sum of assets under management across all share classes of the fund.
Adv. legal form	Form ADV-Schedule A, item 3A	Dummy variable	=1 if the advisor's legal form is, respectively, Corporation, LLC, Partnership and Others.
Turnover	Morningstar Direct	%	This is computed by taking the lesser of purchases or sales and dividing by average monthly net assets.
Tracking error volatility	Morningstar Direct	%	The volatility of fund excess returns relative to the benchmark of the Morningstar Category Index.
Performance-adv. fee	Form NSAR	Dummy variable	=1 if the fund employs a performance incentive fee (fulcrum fee) in the advisory contract, 0 otherwise.

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Table I
Summary Statistics for Portfolio Manager Compensation Structures

This table reports the distribution of compensation structures (Panel A), summary statistics on evaluation periods (Panel B), further breakdown of nonfixed salary (Panel C), statistics on the relative weight of bonus versus base salary, (Panel D), and the correlation matrix of portfolio manager compensation structures (Panel E). Information on the compensation structures of portfolio managers is hand-collected from funds' Statement of Additional Information (SAI), available from the SEC EDGAR database. The sample consists of diversified domestic equity funds, bond funds, allocation funds, global funds, and other funds, with 20,347 fund-year observations over the period 2006 to 2011. The variable *Fixed salary* is an indicator variable that equals one if the portfolio manager receives a fixed amount of compensation from the advisor, and zero otherwise. *Performance pay* is a dummy variable that is set to one if the bonus is tied to the investment performance of the fund, and zero otherwise. *Advisor-profits pay* is a dummy variable that is set to one if the portfolio manager's compensation depends on the advisor's profits, and zero otherwise. *AUM pay* is an indicator variable that equals one if portfolio manager compensation is tied to the fund's AUM, and zero otherwise. *Deferred compensation* is set to one if the compensation description includes a deferred compensation plan, and zero otherwise. Most funds report multiple evaluation windows: *Evaluation period Min* is the shortest evaluation window, and *Evaluation period Max* is the longest evaluation window. For funds that have multiple reported evaluation windows, we calculate *Evaluation period Mean* as the mean of *Evaluation period Min* and *Evaluation period Max*. *p*-values are in brackets in Panel E.

Panel A: Summary Statistics of Compensation Structures

	Observations	% of sample
Total	20,347	100%
Fixed salary	268	1.32%
Nonfixed salary	20,079	98.68%
Performance pay	16,082	79.04%
Advisor-profit pay	10,354	50.89%
AUM pay	3,990	19.61%
Deferred comp.	5,985	29.41%

Panel B: Summary Statistics of Evaluation Periods

Variables (years)	Obs.	Mean	Median	Std. dev.	Min	Max
Evaluation period Mean	13,759	3.02	3.00	1.16	0.25	7.50
Evaluation period Max	13,759	4.40	5.00	1.87	0.25	10.00
Evaluation period Min	13,759	1.64	1.00	1.29	0.25	5.00

Panel C: Further Breakdown of Nonfixed Salary

Performance pay	*Advisor-profit pay*	*AUM pay*	Observations	% of Nonfixed salary obs.
1	0	0	7,244	36.10%
1	1	0	5,104	25.42%
1	0	1	1,465	7.30%
1	1	1	2,269	11.30%
0	1	0	2,914	14.50%
0	0	1	189	0.94%
0	1	1	67	0.33%
0	0	0	827	4.12%
Total Nonfixed salary			20,079	100.0%

Panel D: Statistics on the Relative Weight of Bonus vs. Base Salary

Cases with Bonus/Salary ratio reported	Observations	%
Bonus/Salary < 100%	398	31.7%
100% ≤ Bonus/Salary ≤ 200%	419	33.3%
Bonus/Salary > 200%	439	35.0%
Total	1,256	100.0%

Cases with implied information on Bonus/Salary ratio	Observations	%
Bonus may exceed the base salary	3,788	35.6%
Multiple times the base salary	1,332	12.5%
Significant/material/substantial portion of total comp.	5,083	47.7%
Strong bonus potential/generous bonus	444	4.2%
Total	10,647	100.0%

Panel E: Correlation Matrix

	Performance pay	*Advisor-profit pay*	*AUM pay*	*Deferred comp.*	*Evaluation period Mean*
Performance pay	1				
Advisor-profit pay	-0.23	1			
	[0.00]				
AUM pay	0.17	0.07	1		
	[0.00]	[0.00]			
Deferred comp.	0.20	-0.01	0.06	1	
	[0.00]	[0.04]	[0.00]		
Evaluation period Mean	0.04	-0.31	-0.15	-0.15	1
	[0.00]	[0.00]	[0.00]	[0.00]	

Table II
Summary Statistics for Advisor, Fund, and Portfolio Manager Characteristics

This table reports summary statistics for the advisor, fund, and portfolio manager characteristics as well as the control variables for our sample funds. All variables are defined in the Appendix of the paper, with additional information on units and data sources. P1 and P99 stand for the 1st and 99th percentiles, respectively.

Variable	Mean	St. dev.	P1	Median	P99	Obs.
Advisor variables						
Client HHI	0.346	0.273	0.122	0.195	1.000	20,073
Broker (dummy)	0.826	0.379	0.000	1.000	1.000	20,110
Bank (dummy)	0.653	0.476	0.000	1.000	1.000	20,110
Owner (dummy)	0.183	0.387	0.000	0.000	1.000	20,347
Advisor ownership (%)	8.017	22.007	0.000	0.000	90.000	20,347
Subadvised (dummy)	0.205	0.404	0.000	0.000	1.000	20,347
City AUM ($ Billion)	2,606.8	3,122.6	0.7	571.6	9,629.2	20,063
Ln(City AUM)	27.03	2.41	20.43	27.07	29.90	20,063
Fund and portfolio manager variables						
Institutional fund (dummy)	0.057	0.231	0.000	0.000	1.000	20,347
Avg. account size ($ Thousand)	5,887	85,749	4.580	51.070	101,239	19,748
Ln(Avg. account size)	4.44	2.20	1.52	3.93	11.53	19,748
Flow-perf. sensitivity	0.038	1.699	-8.560	0.000	9.338	20,217
Fund ownership ($)	371,306	721,154	0.00	30,000	3,300,000	18,491
Ln(Fund ownership)	7.00	6.33	0.00	10.31	15.01	18,491
Experience (months)	116.9	63.4	10.0	108.5	295.0	20,307
Ln(Experience)	4.58	0.69	2.30	4.69	5.69	20,301
#Funds managed	6.42	8.16	1.00	4.00	42.50	20,307
Team (dummy)	0.657	0.475	0.000	1.000	1.000	20,347
Control variables						
Family size ($ Million)	86,459	178,728	0.000	15,718	796,659	20,347
Ln(Family size)	10.03	2.28	3.74	10.55	13.83	20,308
Family growth (%)	12.76	154.19	-52.92	10.24	125.63	20,293
Fund age (months)	178.2	137.8	14.0	156.0	784.0	20,347
Ln(Fund age)	4.91	0.80	2.64	5.05	6.66	20,347
Expense (%)	1.171	0.453	0.100	1.170	2.283	20,347
Fund size ($ Million)	1,490	6,110	17.050	295.00	20,000	20,347
Ln(Fund size)	19.60	1.62	16.65	19.50	23.72	20,347
Turnover (%)	92.53	161.87	2.00	56.00	667.00	19,750
Tracking error volatility (%)	4.909	4.588	0.263	3.876	22.168	20,285
Performance-adv. fee (dummy)	0.043	0.203	0.000	0.000	1.000	20,345

Table III
Determinants of Portfolio Manager Compensation Structures

This table reports results from logistic regressions of the compensation structures of portfolio managers on a set of determinant and control variables. We present both the coefficients (Coeff.) and the marginal effects (ME) at the means. Dependent variables are defined in Table I and independent variables are defined in the Appendix. All determinant and control variables are lagged by one year. Standard errors are clustered at the family level and *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Performance pay		*Advisor-profits pay*		*AUM pay*		*Deferred comp.*	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
	Coeff.	ME	Coeff.	ME	Coeff.	ME	Coeff.	ME
Hypothesis 1: Intensity of agency conflicts								
Client HHI	-1.287**	-12.46%	1.070**	26.56%	-0.057	-0.76%	-1.037	-18.28%
	(-2.11)		(2.01)		(-0.10)		(-1.60)	
Broker	0.634*	6.13%	0.347	8.61%	-0.297	-3.97%	1.480***	26.07%
	(1.82)		(1.05)		(-0.80)		(2.86)	
Bank	1.036***	10.02%	-0.016	-0.39%	0.005	0.07%	-0.291	-5.13%
	(2.98)		(-0.05)		(0.02)		(-0.57)	
Owner	-1.253***	-12.12%	2.231***	55.36%	0.671	8.97%	-1.647**	-29.03%
	(-3.46)		(6.05)		(1.60)		(-2.38)	
Advisor ownership	-1.069**	-10.35%	0.018	0.45%	-0.642	-8.58%	-1.910*	-33.65%
	(-2.45)		(0.04)		(-1.08)		(-1.93)	
Hypothesis 2: Alternative monitoring mechanisms								
Institutional fund	-0.844*	-8.17%	0.144	3.57%	-0.345	-4.62%	-0.173	-3.05%
	(-1.81)		(0.45)		(-0.93)		(-0.48)	
Ln(*Fund ownership*)	-0.003	-0.03%	-0.038***	-0.93%	0.010	0.13%	0.005	0.08%
	(-0.23)		(-2.97)		(0.76)		(0.35)	
Flow-perf. sensitivity	-3.903*	-37.77%	-0.795	-19.72%	-1.589	-21.24%	2.222	39.15%
	(-1.70)		(-0.47)		(-0.79)		(1.33)	
Subadvised	-0.876**	-8.47%	0.559*	13.88%	0.177	2.37%	0.095	1.68%
	(-2.50)		(1.93)		(0.61)		(0.32)	
Hypothesis 3: Managerial characteristics								
Ln(*Experience*)	0.139	1.34%	0.026	0.65%	-0.059	-0.78%	0.107	1.88%
	(1.27)		(0.28)		(-0.66)		(0.89)	
# Funds managed	-0.018	-0.18%	-0.026**	-0.64%	-0.016	-0.22%	-0.003	-0.05%
	(-1.08)		(-2.16)		(-1.27)		(-0.19)	
Team	0.125	1.21%	-0.044	-1.09%	0.174	2.32%	0.509*	8.97%
	(0.49)		(-0.21)		(0.75)		(1.76)	
Ln(*City AUM*)	-0.062	-0.60%	0.153**	3.81%	0.166*	2.21%	0.021	0.37%
	(-0.69)		(2.40)		(1.94)		(0.24)	
Control variables								
Ln(*Family size)*	0.439***	4.24%	-0.218***	-5.40%	-0.226***	-3.02%	0.011	0.19%
	(6.91)		(-2.73)		(-2.63)		(0.10)	
Family growth	0.009	0.09%	-0.006	-0.14%	-0.484	-6.47%	-0.692	-12.20%
	(0.87)		(-0.22)		(-1.20)		(-1.04)	
Ln(*Age*)	-0.127	-1.23%	-0.005	0.12%	-0.003	0.04%	-0.066	-1.16%
	(-1.52)		(-0.06)		(-0.03)		(-0.73)	
Expense	0.329	3.18%	-0.195	-4.84%	0.544**	7.27%	0.408	7.18%

	(0.92)		(-0.73)		(2.24)		(1.30)	
Ln(*Fund size*)	-0.090*	-0.87%	0.032	0.79%	0.012	0.16%	0.053	0.93%
	(-1.71)		(0.59)		(0.26)		(1.28)	
Track error volatility	0.001	0.01%	-0.020	-0.49%	-0.018	-0.25%	0.018	0.32%
	(0.04)		(-1.34)		(-0.89)		(1.07)	
Advisor's legal form								
Ltd. Liability Comp.	-0.300	-2.90%	0.694**	17.23%	-0.684*	-9.14%	0.124	2.18%
	(-1.07)		(2.03)		(-1.85)		(0.35)	
Partnership	-1.788*	-17.30%	0.645	15.99%	0.126	1.68%	0.643	11.30%
	(-1.94)		(1.09)		(0.23)		(0.94)	
Other	-0.692	-6.70%	2.215***	54.97%	-0.499	-6.67%	-0.419	-7.38%
	(-1.59)		(3.26)		(-0.75)		(-0.53)	
Fund objective								
Allocation	-0.334	-3.23%	0.379*	9.40%	-0.140	-1.87%	0.026	0.46%
	(-1.31)		(1.75)		(-0.60)		(0.12)	
Bond	0.055	0.53%	-0.107	-2.66%	-0.001	-0.01%	-0.09	-1.63%
	(0.19)		(-0.57)		(-0.00)		(-0.45)	
Global	-0.305	-2.96%	-0.222	-5.50%	-0.283	-3.78%	-0.220	-3.88%
	(-1.32)		(-1.31)		(-1.61)		(-1.42)	
Other funds	-1.088***	-10.50%	0.325	8.07%	0.339	4.54%	-0.269	-4.74%
	(-2.60)		(0.86)		(0.89)		(-0.79)	
Alternative compensation structures								
Performance pay			-0.061	-1.51%	2.102***	28.10%	0.690	12.17%
			(-0.13)		(5.35)		(1.07)	
Advisor-profit pay	0.044	0.42%			0.148	1.98%	0.348	6.13%
	(0.09)				(0.36)		(0.82)	
AUM pay	2.053***	19.87%	0.187	4.64%			0.141	2.49%
	(3.76)		(0.45)				(0.34)	
Deferred comp.	0.292	2.83%	0.336	8.33%	0.119	1.59%		
	(0.44)		(0.83)		(0.29)			
Constant	0.590		-3.450*		-5.682**		-4.866**	
	(0.23)		(-1.65)		(-2.35)		(-2.08)	
Year dummies	Yes		Yes		Yes		Yes	
Observations	17,375		17,375		17,375		17,375	
Pseudo-R^2	0.393		0.177		0.118		0.144	

Table IV
Bootstrapping Simulations

The table reports the distribution of the *t*-statistic for each of the determinant variables across 1,000 bootstrapping simulations. In the bootstrapping, we first randomize 1,000 times across the four compensation structures (i.e., *Performance pay*, *Profit-based pay*, *AUM pay*, and *Deferred compensation*) simultaneously to match exactly the distribution of the actual fund sample as shown in Panels A and C of Table I while maintaining the actual values for all other variables. After each simulation, we repeat the logistic regressions by relating randomly assigned compensation structures to the set of determinants and control variables reported in Table III. Finally, we calculate the percentiles of the *t*-statistic for each of the determinant variables across the 1,000 simulations. P5, P25, P50, P75, ad P95 stand for 5th, 25th, 50th, 75th, and 95th percentile respectively.

Statistic	*Client HHI*	*Broker*	*Bank*	*Owner*	*Adv. ownership*	*Inst. fund*	*Ln(Fund own.)*	*Flow-perf. sensitivity*	*Subadv.*	*Ln(Exp.)*	*# Funds managed*	*Team*	*Ln(City AUM)*
						Performance pay							
Mean	0.02	-0.01	0.01	0.01	0.01	0.03	-0.01	0.00	0.01	-0.02	-0.04	0.03	-0.01
P5	-1.70	-1.81	-1.68	-1.72	-1.58	-1.75	-1.68	-1.72	-1.65	-1.69	-1.74	-1.55	-1.68
P25	-0.74	-0.66	-0.72	-0.74	-0.73	-0.68	-0.65	-0.62	-0.61	-0.73	-0.71	-0.61	-0.70
P50	0.02	0.03	-0.02	-0.03	0.01	0.01	-0.02	0.00	-0.01	-0.03	-0.01	0.04	0.00
P75	0.76	0.70	0.75	0.75	0.68	0.75	0.67	0.65	0.67	0.71	0.62	0.67	0.65
P95	1.87	1.62	1.71	1.73	1.66	1.78	1.57	1.72	1.68	1.72	1.58	1.74	1.69
						Advisor-profit pay							
Mean	0.02	0.03	-0.09	0.01	-0.08	-0.01	-0.01	-0.04	-0.01	-0.02	0.00	-0.03	0.01
P5	-1.80	-1.64	-1.74	-1.72	-1.80	-1.61	-1.63	-1.72	-1.69	-1.71	-1.67	-1.77	-1.74
P25	-0.71	-0.67	-0.78	-0.59	-0.80	-0.72	-0.71	-0.80	-0.64	-0.70	-0.69	-0.71	-0.72
P50	0.02	0.03	-0.08	0.03	-0.13	-0.02	-0.03	-0.02	-0.01	-0.02	-0.03	-0.01	0.02
P75	0.75	0.70	0.61	0.70	0.65	0.70	0.65	0.66	0.68	0.67	0.69	0.63	0.72
P95	1.87	1.79	1.58	1.63	1.70	1.68	1.76	1.76	1.58	1.69	1.76	1.74	1.73
						AUM pay							
Mean	0.01	-0.03	-0.01	-0.03	0.04	-0.03	0.04	0.01	0.00	0.02	-0.01	0.03	0.04
P5	-1.68	-1.64	-1.65	-1.72	-1.57	-1.73	-1.59	-1.62	-1.85	-1.67	-1.65	-1.60	-1.66
P25	-0.70	-0.72	-0.72	-0.76	-0.72	-0.66	-0.71	-0.60	-0.65	-0.65	-0.69	-0.63	-0.69
P50	-0.01	-0.06	-0.02	-0.03	0.03	-0.02	0.04	0.00	-0.04	0.04	-0.08	0.05	0.04
P75	0.73	0.66	0.68	0.64	0.79	0.63	0.69	0.66	0.68	0.71	0.62	0.64	0.77
P95	1.75	1.62	1.66	1.74	1.78	1.55	1.83	1.68	1.82	1.70	1.61	1.66	1.80
						Deferred compensation							

Mean	0.01	0.04	-0.05	0.02	-0.02	-0.03	0.01	0.00	0.00	-0.03	-0.01	0.03	0.01
P5	-1.73	-1.67	-1.88	-1.67	-1.82	-1.79	-1.65	-1.64	-1.66	-1.74	-1.78	-1.59	-1.73
P25	-0.75	-0.68	-0.76	-0.69	-0.68	-0.72	-0.70	-0.73	-0.73	-0.78	-0.74	-0.66	-0.66
P50	0.01	0.02	0.00	0.02	-0.03	-0.04	-0.01	-0.03	-0.01	-0.03	-0.05	0.06	0.01
P75	0.74	0.79	0.68	0.73	0.73	0.65	0.69	0.69	0.69	0.68	0.73	0.67	0.73
P95	1.74	1.80	1.62	1.88	1.70	1.68	1.83	1.74	1.78	1.75	1.65	1.71	1.77

Table V
Changes in Portfolio Manager Compensation Structures

The table presents coefficients from OLS regressions of changes in compensation structures on changes in the determinant and control variables. We identify a total of 423 changes in the advisory firm (either the advisor or the subadvisor). For every compensation structure, the dummy variable *Adopt* takes a value of one if the new advisory firm starts to use the compensation structure, and zero otherwise. Likewise, the dummy variable *Drop* takes a value of one if the new advisory firm ceases to use the compensation structure, and zero if it continues to use it. For each determinant and control variable in Table III, we define the corresponding Δ*Determinant* and Δ*Control variable* as the difference between the current value of the variable and the value of the same variable the year before the change. Standard errors are clustered at the family level and *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Performance pay		*Advisor-profit pay*		*AUM pay*		*Deferred comp.*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔDeterminant	*Adopt*	*Drop*	*Adopt*	*Drop*	*Adopt*	*Drop*	*Adopt*	*Drop*
Hypothesis 1: Intensity of agency conflicts								
Client HHI	-0.620***	-0.017	-0.009	-0.063	-0.336***	-0.144	-0.253**	-0.029
	(-3.31)	(-0.11)	(-0.05)	(-0.46)	(-2.73)	(-0.53)	(-2.34)	(-0.14)
Broker	0.011	0.112	-0.037	-0.075	-0.109	0.217	0.067	-0.551**
	(0.10)	(1.10)	(-0.35)	(-0.78)	(-1.35)	(1.09)	(0.84)	(-2.48)
Bank	0.144	-0.104*	-0.086	-0.032	-0.114**	-0.352*	0.187**	0.035
	(1.04)	(-1.84)	(-1.00)	(-0.42)	(-2.14)	(-1.78)	(2.31)	(0.18)
Owner	0.124	0.184	0.405***	-0.087	-0.145*	0.504**	-0.178**	0.276
	(1.31)	(1.57)	(3.38)	(-0.78)	(-1.75)	(2.80)	(-2.51)	(1.49)
Advisor ownership	-0.405	-0.026	0.219	-0.021	-0.145	-0.091	0.149	0.140
	(-1.52)	(-0.13)	(1.13)	(-0.10)	(-0.98)	(-0.24)	(1.11)	(0.48)
Hypothesis 2: Alternative monitoring mechanisms								
Ln(*Avg. acc. size*)	-0.223***	0.073*	0.089	0.060	-0.071	-0.024	-0.082*	-0.049
	(-3.57)	(1.86)	(1.60)	(1.01)	(-1.58)	(-0.35)	(-1.74)	(-0.27)
Fund ownership	-0.037**	-0.004	-0.017	-0.012	-0.017	0.015	-0.000	0.019*
	(-2.64)	(-0.48)	(-1.07)	(-1.16)	(-1.09)	(1.49)	(-0.00)	(1.92)
Flow-perf. sensitivity	1.853	-2.383	-0.349	-0.889	0.619	0.608	0.310	-5.795***
	(0.96)	(-1.06)	(-0.09)	(-0.95)	(0.81)	(0.10)	(0.25)	(-2.87)
Subadvised	-0.103	0.212***	-0.159	0.079	-0.102*	0.037	-0.116*	-0.122
	(-0.79)	(3.13)	(-1.66)	(1.03)	(-1.87)	(0.19)	(-1.94)	(-1.23)
Hypothesis 3: Managerial characteristics								
Ln(*Experience*)	0.049	-0.002	-0.030	0.025	-0.082*	0.055	0.069**	0.074
	(0.79)	(-0.05)	(-0.53)	(0.42)	(-1.91)	(0.57)	(2.14)	(0.58)
# Funds managed	0.008	-0.006	0.018	-0.000	0.024**	-0.014**	0.010	-0.006
	(0.69)	(-0.51)	(1.03)	(-0.02)	(2.46)	(-2.16)	(1.31)	(-0.31)
Team	-0.016	0.100	0.024	0.043	-0.114	0.117	0.047	-0.129
	(-0.12)	(1.28)	(0.28)	(0.41)	(-1.34)	(1.07)	(0.68)	(-0.79)
Ln(*City AUM*)	-0.011	-0.004	0.014	-0.002	-0.003	0.045	-0.054***	0.027
	(-0.40)	(-0.21)	(0.61)	(-0.14)	(-0.23)	(1.35)	(-4.98)	(0.95)
ΔControl variable								
Ln(*Family size)*	-0.342	0.187	-0.498	-0.224	0.379*	0.080	-0.502**	0.472
	(-1.33)	(0.78)	(-1.47)	(-0.74)	(1.91)	(0.12)	(-2.14)	(0.87)
Family growth	-0.004	-0.144	-1.068***	-0.233	0.117	-0.065	0.213	0.528
	(-0.02)	(-0.65)	(-3.87)	(-0.90)	(0.71)	(-0.16)	(1.36)	(1.20)

Ln(*Age*)	0.589**	-0.122	0.797	0.178	0.207	-0.371	-0.387*	-0.303
	(2.70)	(-0.59)	(1.58)	(0.72)	(0.83)	(-0.90)	(-1.79)	(-1.12)
Expense	-0.398*	0.038	-0.006	0.015	-0.453***	0.766	-0.221	0.468
	(-1.90)	(0.11)	(-0.02)	(0.06)	(-3.32)	(0.71)	(-1.16)	(0.73)
Ln(*Fund size*)	0.026	-0.059	-0.050	-0.126	-0.066	-0.144	0.109	0.117
	(0.31)	(-0.82)	(-0.59)	(-1.65)	(-0.85)	(-0.84)	(1.28)	(0.99)
Track error volatility	-0.052***	-0.005	-0.054**	0.028	-0.017*	-0.023	0.028**	-0.032
	(-3.06)	(-0.47)	(-2.46)	(1.67)	(-1.88)	(-0.90)	(2.07)	(-1.42)
Advisor's legal form								
Ltd. Liability Comp.	0.008	0.088	0.357***	-0.209	0.021	-0.151	-0.028	0.451***
	(0.06)	(0.88)	(3.02)	(-1.67)	(0.20)	(-0.59)	(-0.31)	(2.92)
Partnership	-0.188	0.321	0.636***	0.174	0.079	-0.234	-0.409***	-0.062
	(-0.94)	(1.18)	(3.37)	(0.66)	(0.55)	(-0.31)	(-3.37)	(-0.18)
Other	-0.864***	-0.045	0.174	-0.174	-0.575***	0.430	0.208	0.440
	(-3.41)	(-0.19)	(0.59)	(-0.80)	(-3.93)	(1.30)	(1.08)	(1.47)
Constant	0.121	0.499***	0.059	0.458**	0.197	1.016**	0.119	0.130
	(0.46)	(2.73)	(0.37)	(2.54)	(1.63)	(2.16)	(0.92)	(0.71)
Fund obj. dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	77	224	117	184	218	83	203	98
Adj. R^2	0.43	0.20	0.46	0.21	0.25	0.28	0.37	0.39

Table VI
Determinants of Performance Evaluation Period

The table reports coefficients from OLS regressions of portfolio managers' average evaluation period (*Evaluation period Mean*) on a set of determinant and control variables. The sample used in this analysis includes only those funds that use performance-based pay to compensate their managers. *Tracking error volatility* is the 12-month lagged volatility of the fund returns net of the return on the fund's associated Morningstar benchmark. The rest of independent variables are defined in the Appendix. Standard errors are clustered at the family level and *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Average Evaluation Period					
Flow-perf. sensitivity	-1.540*					-1.713**
	(-1.71)					(-2.00)
Turnover/100		-0.044				-0.044
		(-1.20)				(-1.27)
Track error volatility			0.012			0.011
			(0.87)			(0.90)
Team				-0.396**		-0.383**
				(-2.53)		(-2.39)
Experience					-0.014	-0.023
					(-0.22)	(-0.40)
Control variables						
Ln(Family size)	0.254***	0.254***	0.256***	0.238***	0.253***	0.238***
	(3.28)	(3.22)	(3.34)	(3.55)	(3.30)	(3.61)
Family growth	0.970**	0.951**	0.946**	0.920**	0.967**	0.896**
	(2.60)	(2.60)	(2.53)	(2.54)	(2.59)	(2.51)
Ln(Age)	-0.009	-0.012	-0.010	-0.024	-0.008	-0.031
	(-0.26)	(-0.36)	(-0.31)	(-0.81)	(-0.26)	(-1.01)
Expense	-0.003	0.010	-0.021	0.007	0.000	-0.008
	(-0.02)	(0.07)	(-0.15)	(0.05)	(0.00)	(-0.06)
Ln(Fund size)	0.039	0.038	0.039	0.050**	0.040	0.051**
	(1.45)	(1.39)	(1.48)	(1.98)	(1.55)	(2.21)
Fund objective						
Allocation	-0.372***	-0.374***	-0.384***	-0.301***	-0.368***	-0.321***
	(-3.39)	(-3.38)	(-3.44)	(-3.15)	(-3.39)	(-3.25)
Bond	-0.214*	-0.199	-0.173	-0.216**	-0.209*	-0.170
	(-1.87)	(-1.64)	(-1.60)	(-2.02)	(-1.84)	(-1.59)
Global	0.149	0.143	0.148	0.164	0.146	0.157
	(0.91)	(0.89)	(0.92)	(1.02)	(0.90)	(1.00)
Other funds	-0.323*	-0.284	-0.331*	-0.262	-0.316	-0.246
	(-1.69)	(-1.62)	(-1.69)	(-1.42)	(-1.65)	(-1.42)
Alternative compensation structures						
Advisor-profit pay	-0.409**	-0.407**	-0.400**	-0.406**	-0.407**	-0.398**
	(-2.40)	(-2.39)	(-2.34)	(-2.39)	(-2.38)	(-2.34)
AUM pay	-0.146	-0.138	-0.143	-0.096	-0.146	-0.092
	(-0.77)	(-0.73)	(-0.78)	(-0.53)	(-0.77)	(-0.51)
Deferred comp.	-0.261	-0.261	-0.262	-0.222	-0.262	-0.220
	(-1.50)	(-1.49)	(-1.51)	(-1.36)	(-1.51)	(-1.35)

Constant	-0.206	-0.126	-0.243	0.062	-0.149	0.153
	(-0.29)	(-0.18)	(-0.35)	(0.09)	(-0.20)	(0.21)
Advisor legal form dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,041	12,920	13,012	13,041	13,036	12,887
Adj. R^2	0.31	0.31	0.32	0.34	0.31	0.34

Table VII
Portfolio Manager Compensation and Mutual Fund Performance

This table reports results from OLS regressions of fund performance on various compensation structures. We analyze performance-based pay, AUM-based pay, advisor-profit-based pay, and deferred compensation in Panel A and average evaluation period in Panel B. In each panel, we use diversified domestic equity funds in columns (1) to (2), bond funds in columns (3) and (4), and the remaining funds in columns (5) and (6). For diversified domestic equity funds, we estimate alpha using monthly fund returns and the Carhart (1997) four-factor model. For bond funds, we estimate performance using a bond four-factor model based on Cici and Gibson (2012). For the remaining funds, we estimate alpha using a one-factor model, with the average return of the fund's Morningstar category as the factor. Gross alphas are computed using fund monthly gross returns calculated by adding back 1/12th of the annual expense ratio to monthly net returns. We have a comprehensive set of control variables in the regressions, including all of the determinant and control variables used in Table III and other variables such as fund turnover ratio and a performance advisory-fee dummy. Standard errors are clustered at the family level and *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Compensation Structures

	Domestic Equity funds		Bond funds		Other funds	
	(1)	(2)	(3)	(4)	(5)	(6)
	Gross alpha	Net alpha	Gross alpha	Net alpha	Gross alpha	Net alpha
Compensation structure						
Performance pay	0.681	0.737	-0.524	-0.548	-0.616	-0.503
	(1.42)	(1.54)	(-0.99)	(-1.04)	(-0.97)	(-0.81)
AUM pay	-0.681	-0.727	-0.123	-0.155	0.846	0.755
	(-1.35)	(-1.44)	(-0.49)	(-0.62)	(1.09)	(1.00)
Advisor-profit pay	0.002	0.005	-0.398	-0.374	-0.209	-0.162
	(0.00)	(0.01)	(-1.29)	(-1.22)	(-0.38)	(-0.30)
Deferred compensation	-0.337	-0.319	0.365	0.318	0.008	-0.032
	(-0.89)	(-0.85)	(1.01)	(0.88)	(0.01)	(-0.05)
Control variables						
Ln*(Fund size)*	-0.085	-0.067	-0.171***	-0.149**	-0.305***	-0.289***
	(-1.04)	(-0.82)	(-2.88)	(-2.50)	(-2.75)	(-2.67)
Ln*(Age)*	0.359***	0.353***	0.089	0.086	0.288*	0.283*
	(2.89)	(2.86)	(0.56)	(0.54)	(1.80)	(1.81)
Expense	0.546	-0.197	-0.234	-0.867***	0.274	-0.542
	(1.34)	(-0.48)	(-0.74)	(-2.73)	(0.80)	(-1.58)
Ln*(Turnover)*	-0.378***	-0.363***	0.046	0.047	-0.115	-0.133
	(-2.94)	(-2.82)	(0.62)	(0.62)	(-0.85)	(-1.02)
Performance-adv. fee	0.135	0.097	0.613	0.602	0.284	0.311
	(0.42)	(0.31)	(1.31)	(1.29)	(0.32)	(0.34)
Constant	-4.961*	-5.440*	-3.805	-4.293	-2.158	-1.245
	(-1.76)	(-1.93)	(-1.36)	(-1.54)	(-0.72)	(-0.41)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Fund family × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund category FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,893	5,893	4,118	4,118	3,812	3,812
Adj. R^2	0.03	0.03	0.13	0.13	0.04	0.04

Panel B: Evaluation Period						
	Dom. Equity funds		Bond funds		Other funds	
	(1)	(2)	(3)	(4)	(5)	(6)
	Gross alpha	Net alpha	Gross alpha	Net alpha	Gross alpha	Net alpha
Evaluation Period Mean	-0.035	-0.019	-0.007	0.012	0.252	0.284
	(-0.17)	(-0.09)	(-0.03)	(0.05)	(0.49)	(0.57)
Control variables						
Ln*(Fund size)*	-0.088	-0.070	-0.130**	-0.109*	-0.276**	-0.261**
	(-1.18)	(-0.93)	(-2.12)	(-1.78)	(-2.28)	(-2.18)
Ln*(Age)*	0.358**	0.354**	0.052	0.042	0.167	0.186
	(2.50)	(2.48)	(0.30)	(0.24)	(1.29)	(1.43)
Expense	0.473	-0.265	-0.413	-1.064***	0.692**	-0.145
	(1.14)	(-0.63)	(-1.18)	(-3.07)	(2.11)	(-0.44)
Ln*(Turnover)*	-0.330*	-0.312*	0.075	0.075	-0.286*	-0.291*
	(-1.96)	(-1.84)	(0.81)	(0.80)	(-1.79)	(-1.89)
Performance-adv. fee	0.082	0.040	0.907*	0.903*	-0.344	-0.372
	(0.20)	(0.10)	(1.83)	(1.83)	(-0.46)	(-0.48)
Constant	-1.306	-1.765	3.006	2.244	-3.445	-2.494
	(-0.29)	(-0.40)	(0.80)	(0.58)	(-1.04)	(-0.75)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Fund family × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund category FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,718	3,718	3,008	3,008	2,509	2,509
Adj. R^2	0.04	0.04	0.14	0.14	0.05	0.05

Table VIII
Portfolio Manager Compensation and Mutual Fund Fees

This table reports results from OLS regressions of mutual fund fees on various compensation structures including performance-based pay, AUM-based pay, advisor-profit-based pay, and deferred compensation. We measure fund fees in two ways: (i) percentage of fund AUM and (ii) the logarithm of dollar fees (=AUM * percentage fee). We analyze total fund fees and expenses in columns (1) and (4). We also separately examine the two components of fund fees: (i) advisory fees (i.e., the fee paid to the advisor) in columns (2) and (5) and (ii) other fees (i.e., fees related to marketing, distribution, 12b-1, and bookkeeping) in columns (3) and (6). We employ a comprehensive set of control variables in the regressions, including all of the determinant and control variables used in Table III and other variables such as fund turnover ratio and a performance advisory-fee dummy. Standard errors are clustered at the family level and *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Percentage fees			Dollar fees		
	(1)	(2)	(3)	(4)	(5)	(6)
	Total	Advisory	Other	Total	Advisory	Other
Compensation structure						
Performance pay	-0.018	0.046**	-0.064***	0.017	0.132***	-0.171**
	(-1.03)	(2.43)	(-3.09)	(0.65)	(2.95)	(-2.49)
Advisor-profit pay	-0.011	-0.020*	0.009	-0.030	-0.074**	0.001
	(-1.13)	(-1.82)	(0.58)	(-1.24)	(-2.30)	(0.01)
AUM pay	0.042***	0.034**	0.008	0.060**	0.064	0.009
	(3.56)	(2.09)	(0.39)	(2.47)	(1.46)	(0.14)
Deferred compensation	0.002	-0.017	0.019	-0.003	-0.014	0.118
	(0.18)	(-1.17)	(0.97)	(-0.08)	(-0.33)	(1.46)
Control variables						
Ln*(Fund size)*	-0.016***	0.010***	-0.026***	0.983***	1.011***	0.933***
	(-5.78)	(3.17)	(-6.89)	(158.86)	(94.69)	(57.51)
Ln*(Age)*	0.001	-0.021***	0.022***	-0.049***	-0.067***	0.049
	(0.24)	(-2.97)	(2.70)	(-4.35)	(-2.85)	(1.31)
Expense	0.759***	0.356***	0.403***	0.758***	0.636***	1.227***
	(35.29)	(11.16)	(14.56)	(13.11)	(8.98)	(9.59)
Ln*(Turnover)*	-0.003	0.014***	-0.017***	-0.010	0.040***	-0.059***
	(-1.22)	(3.86)	(-4.93)	(-1.15)	(2.92)	(-3.92)
Performance-adv. fee	0.042*	0.014	0.028	0.082***	0.101**	0.106*
	(1.87)	(0.73)	(1.13)	(3.45)	(2.30)	(1.95)
Constant	0.373***	0.038	0.336***	1.961***	0.622*	0.810
	(5.32)	(0.33)	(2.65)	(10.17)	(1.87)	(1.47)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Fund family × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund category FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,779	13,779	13,779	13,501	13,501	13,208
Adj. R^2	0.82	0.64	0.43	0.94	0.89	0.79